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STUDY GUIDE

To Accompany
GARDNER MURPHY'S
A Briefer
General Psychology

BY
E. L. HOROWITZ



HARPER & BROTHERS PUBLISHERS

New York and London

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STUDY GUIDE
TO ACCOMPANY GARDNER MURPHY'S A BRIEF GENERAL PSYCHOLOGY

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FOREWORD

THIS study guide is designed to give the student what he needs for better understanding and retention of the contents of the textbook. It cannot be substituted for the textbook; it lays no claim to being a complete outline of psychology; but it does make an attempt to indicate the relationships between the more important points made in the textbook so that the student may have both an aid to the understanding of such relationships and a compact, planned means of review.

To use the study guide with maximum efficiency, the student must follow the procedures found best by experimental investigation. The general questions placed before the outline for each chapter should be read and a real attempt made to answer them. At least fifteen minutes should be spent on them before the chapter is begun. Unless such an attempt is earnestly made, they lose their value as pre-tests, which are designed to help the student to assimilate the chapter which is read afterwards. After the questions have been answered as well as is possible, the chapter in the textbook should be read. This is to be followed by doing the exercises placed after each chapter and after the outline of each chapter. The outline offered in the study guide should be read a day after the chapter is read. As aids in reviewing for quizzes, the student should find the section headings for chapters in the Contents of the textbook, the summaries following the chapters, and the outlines in the study guide very valuable.

Study aids in the textbook itself should not be overlooked. The student is urged to familiarize himself thoroughly with Figure 6 on page 43 in the textbook, which tells how to read a graph, and with Figure 14 on page 76, which explains the smoked drum. He should not neglect the GLOSSARY AND INDEX, which contains clear-cut definitions of terms used in the book.

Most of the material in these outlines has been drawn directly from the textbook they are designed to accompany, *A Briefer General Psychology*, by Gardner Murphy. In the frame of the outline, however, emphases may have been changed. Such changes in emphasis may enable the student to see the same material from two different points of view.

E. L. H.

Columbia University
New York
July, 1935

Chapter I

Try to answer these questions before you read Chapter I.

1. What might a science which studies "the individual as a whole" investigate in a single research?
2. In studying human nature, which would prove more valuable (be specific as to *how*): laboratory or everyday observation?
3. Why should the study of human nature depend upon both biological and social sciences?

CHAPTER I—PSYCHOLOGY AS A SCIENCE

- I. The science of psychology is directly concerned with the study of human nature.
 - A. Psychology is closely related to biology.
 1. What we do depends largely on how we are made.
 2. We are products of the evolution of life on the earth.
 - B. Psychology is related to the social sciences.
 - C. Mind is essentially a name for certain activities of persons.
- II. Experimental psychology developed from experimental physiology.
 - A. Information is derived chiefly from experiment.
 - B. The world of nature is too complex for scientific study without the use of instruments.
 - C. Observations of everyday life are taken into the laboratory and tested under controlled and systematically varied conditions.
- III. Psychology is concerned with the whole organism, the whole living being.
 - A. Psychologists try to discover what kinds of causes (stimuli) may lead to each kind of behavior.
 - B. For purposes of description it is convenient, at times, to separate parts of the organism from the rest of it.
 - C. Throughout, one must keep in mind the true unity of responses, although activities are described separately.
- IV. Psychology studies response in the light of the whole organism and the whole environment.
 - A. Psychology is concerned with both external and internal responses.
 1. Behaviorists deny that psychology should study subjective experiences.
 2. For this text, study will be made of both behavior and experience.
 - B. No mental act or behavior can be studied apart from its context in the life of the individual.
 - C. What occurs depends on past activities of the organism and on other elements present in the immediate environment.

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V. Psychology may be defined as the science which treats of the interrelations between the environment and the responses of the organism.

A. In a certain sense all behavior follows basic laws.

B. The laws which are most important in one type of behavior study may be unimportant in another.

C. Different fields of psychology have been developed:

1. General adult normal
2. Child
3. Abnormal
4. Comparative
5. Social
6. Applied
7. Educational
8. Vocational
9. Personality.

NameSection Date.....

Do these exercises after you have read Chapter I. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

- 1. Psychology as a science studies
(a) conscious experience only (b) behavior of organisms only (c) only direct experience as known to the subject as opposed to indirect measures of experience (d) both experience and behavior (e) those properties of living matter which are not dependent on the environment.
- 2. The science of psychology is chiefly rooted in
(a) biology (b) physics (c) chemistry (d) geology (e) economics.
- 3. Experimental psychology was started primarily by
(a) psychologists (b) physiologists (c) anthropologists (d) sociologists (e) philosophers.
- 4. Facts discovered in the laboratory are
(a) not too artificial to be important (b) not applicable outside the laboratory (c) less satisfactory than most observations made in everyday life (d) inferior to literary epigrams (e) the only source of truth.

Chapter II

Try to answer these questions before you read Chapter II.

1. How can the theory of evolution be of interest to students of human nature?
2. What do all living organisms have in common, and what is the importance of these similarities for psychologists?
3. How does man differ from the higher animals?
4. How are social habits transmitted to new generations?
5. How does the mechanism of heredity operate with regard to basic human motives?

CHAPTER II—THE RACIAL ORIGIN OF BEHAVIOR PATTERNS

- I. Motives, tendencies toward particular kinds of action, are properties of living matter.
 - A. Every activity of a living organism is a response to a stimulus.
 - B. Stimuli may act on the body from outside or may be activities within the body.
 - C. Internal stimuli are the physical basis for motives.
 - D. The process by which needs give rise to behavior is called motivation.
 - E. Motives are classified in terms of the kinds of need which the organism has.
- II. The methods by which motives are satisfied become more complicated in the process of evolution.
 - A. The evolution of the nervous system is of importance to psychology.
 - B. Roughly, the more complicated organisms have more complicated and more numerous motives.
 1. Man is a member of the biological group called "primates."
 - a. Man is not a descendant of any existing monkey or ape.
 - b. Species intermediate between man and apes in various respects have been discovered.

It is possible to arrange a graded series of skulls from those which have capacities about equal to that of the chimpanzee through to those having the capacity of modern man.
 2. Man differs from other higher animals in the greater capacity to learn and the capacity to use words.
 - a. Though apes can solve complicated puzzles and problems, they cannot be taught speech.
 - b. A high level of biological development had to be reached before there could be any rapid social evolution.
 - c. Civilization, tradition, are important in the shaping of personalities of both man and animal.

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- C. In general, it is difficult in the higher forms to find a direct relation between needs and the functions developed to satisfy those needs.
- III. Evolution has provided many modes of behavior which serve to adapt animals to their environment.
- A. Reflex arcs are systems of connections in the nervous system whereby a specific stimulus calls out fixed and predictable muscular responses.
 - 1. Not all of the inherited reflexes are always advantageous in civilized society.
 - 2. In the long run, reflexes and emotional responses are such as to protect the individual.
 - B. The capacity to learn is a product of evolution.
 - 1. It permits the addition of a variety of complicated adjustments.
 - 2. Inventions and other forms of indirect contact with the environment are possible.
 - C. The degree of adaptive excellence of any function depends on the whole complex situation.
- IV. Evolutionary development is a function of the laws of heredity.
- A. There are two types of cells in the individual.
 - 1. The body cells' characteristics come to an end at death.
 - a. Changes in the body cells during a lifetime are not inherited.
 - 2. The germ cells, eggs and sperms, have the capacity to produce new individuals.
 - a. Germ cells derive the characteristics which they transmit to offspring from preceding germ cells.
 - B. The biological capacity to develop in a certain way is inherited.
 - 1. The inherited physical equipment provides organs whose functioning is important in motivation.
 - 2. Biological potentialities become actualities chiefly through social opportunities.
 - C. Common, basic human motives are inherited.
 - D. Specific behavior, e.g., specific fears, are not inherited.
 - 1. General tendencies to show a given kind of behavior, e.g., fear, are inherited.
 - 2. Specific fears are mostly the result of personal experience.
 - E. Real hereditary variations must be explained in terms of variation within germ cells:
 - 1. Through a unique combination of genes from parents' chromosomes.
 - 2. Through mutation, the sudden appearance of new genes.
 - a. Inborn tendencies are not inherited habits, not due to what ancestors learned, but are due to a succession of mutations.
- V. In the course of evolution there have developed three kinds of specialized cells of especial interest to psychologists:
- A. Muscles, cells capable of rapid change of shape so as to cause movement.
 - 1. Older in the evolutionary sequence than sense organs or nerves.

2. In human body, primitive kind of muscle, unstriped or unstriated, involuntary.
 3. Later development, striped or striated muscles, voluntary, not found in lowest forms of life.
- B. Sense organs, cells developed with special sensitivity to changes in environment.
1. Each sense organ is the end product of a long series of evolutionary changes.
- C. Nerve cells, cells capable of swift conduction of excitation from one point to another.
1. Earliest nervous system the nerve-net:
 - a. No specific pathways.
 - b. Mass action.
 - c. Clumsy and inefficient type of response to stimulation.
 2. In the course of evolution the nervous system became more finely specialized:
 - a. Definite pathways connecting points.
 - b. Specific pathways leading from sense organ to central connections and out to specific muscle groups.
 - c. Basis for a vast system of interconnection of different types of response developed.
 - (1) These interconnections make learning possible.
 3. Human behavior depends in the last analysis upon connections between our sense organs and our muscles.

Name.....Section.....Date.....

Do these exercises after you have read Chapter II. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

- 1. Hereditary traits arise always as variations in
(a) learning capacity (b) the environment (c) body cells (d) germ cells (e) muscle cells.
- 2. Germ cells derive their chief characteristics from
(a) body cells (b) preceding germ cells (c) the blood stream (d) planetary influences (e) training.
- 3. The so-called "missing links" in man's evolutionary ancestry now form a fairly complete chain of
(a) skulls of increasing capacities (b) decreasing body weights (c) increasing space between the eyes (d) increasing lengths of the thumb (e) decreasing size of the ear lobes.
- 4. Birds and mammals are descended from
(a) worms (b) metaphyta (c) reptiles (d) lizards (e) gastropods.
- 5. The most elaborate nervous system among mammals was developed by the
(a) rabbits (b) bats (c) porcupines (d) elephants (e) apes.
- 6. The size and organization of the brain in various forms of vertebrates reflect
(a) the development of handedness (b) the evolution of the nervous system (c) the stretch from head to tail (d) the relationship to the anthropoid apes (e) the development of thermal adaptation.
- 7. It seems probable that apes can never learn
(a) to make social responses (b) to differentiate between colors (c) to eat with a fork (d) to utter vocal sounds which others can interpret (e) to fly airplanes.
- 8. Man's capacity to learn is
(a) nearer to that of apes than is his emotional equipment (b) proof of the absolute distinctness of man and animals (c) out of all proportion to his nervous system (d) a uniform heritage of all men of a single race (e) a product of his evolution.
- 9. Oldest in the evolution of the race are
(a) the endocrine glands (b) the olfactory bulbs (c) sense organs (d) conducting mechanisms (e) muscle cells.
- 10. The most primitive type of nervous system is
(a) ganglionic (b) composed of reflex arcs (c) the nerve-net (d) arranged lengthwise (e) synaptic.
- 11. The type of primitive musculature still found in man is the
(a) myodes (b) involuntary (c) epithelial (d) myoneme (e) striated.
- 12. Inherited variations in traits arise through
(a) nystagmus (b) mutation (c) resonance (d) kurtosis (e) metabolism.

Chapter III

Try to answer these questions before you read Chapter III.

1. What generalizations can one make concerning the changes in the form of behavior as patterns develop?
2. What behavior is truly innate?
3. How can you account for the striking similarities in the general development of children?
4. How does a reflex arc function?
5. How simple is a simple reflex?

CHAPTER III—THE INDIVIDUAL ORIGIN OF BEHAVIOR PATTERNS

- I. Development of behavior patterns in the race suggests specialization.
 - A. Growth is from simple, unspecialized, to complex, specialized organisms.
 - B. The same kind of development is found in the growth of the individual.
 1. With growth, mass response gives way to specific reflexes.
 2. The growth involved is largely in the central nervous system.
 - a. Stages in the development of the nervous system correspond to stages in animal behavior.
 - b. Anatomical development in the nervous system is often the only requirement for the appearance of new functions in the individual.
 - c. The development of specific reflex arcs replacing mass responses as a result of the development of the nervous system is called individuation.
 - d. Development and changes in behavior due to growth of the individual organism are called maturation.
- II. There is frequent confusion in distinguishing behavior which has developed through maturation and that which has been learned.
 - A. In man maturation goes on before birth as well as afterwards.
 1. In the embryonic period there is a general tendency toward mass response.
 - a. The individual responds more or less as a whole.
 - b. The fact of birth at a given time has little effect upon the maturation going on.
 - c. At the time of birth there is still much mass response.
 - (1) The mass responses are not really "random."
 - (2) The nervous system is but a network of interconnections without the specific, insulated pathways for specific reflexes.

B. Maturation can be sudden and complete whether a simple or a complex act is involved.

1. All new combinations of movements are not due to learning.
2. A healthy animal practices its capacities as fast as they appear.

C. During development, learning is going on throughout, and certain reflex activities are being combined.

III. Behavior which is due almost entirely to growth and which occurs no matter what the social environment is, is the specific hereditary responses called reflexes.

A. Reflexes depend upon a number of structural elements in the body of the individual:

1. A neurone is an individual nerve cell.
 - a. Sensory neurones bring in messages from the sense organs by afferent fibers.
 - b. There are connecting neurones in the brain and spinal cord.
 - c. There are motor neurones going out to the muscles, by efferent fibers.
2. Connections between the neurones are called synapses.
3. The receiving cells are called receptors.
4. The response cells are called effectors:
 - a. Muscles
 - b. Glands.

B. Reflexes may be complicated by the variety of interconnections afforded by the structures involved in the reflex arc.

C. No reflex ever functions in complete independence of the rest of the body:

1. Simple reflexes mostly depend directly upon the spinal cord.
2. More complicated muscular responses depend upon circuits passing up and through the brain.
3. The brain, by means of other neurones passing down, may reinforce or check many reflex activities.
4. The synapse is conceived as having a variable threshold.
 - a. The threshold is the amount of stimulation needed to elicit a response.
 - b. Various factors affect reflex thresholds:
 - (1) Common drugs
 - (2) Fatigue
 - (3) Activities going on in the brain and other parts of the body.

IV. All behavior is really the behavior of the whole individual.

A. Forms of integration need to be studied for their own sake.

B. Isolated acts can only be carried out because of favorable conditions existing in the brain or body as a whole.

C. Normal behavior is a combination of growth and learning.

1. All behavior is complicated by the fact that the organism learns while it grows and grows while it learns.
2. An understanding of maturation proves useful in studying motives and emotion.

Name Section Date

Do these exercises after you have read Chapter III. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

- 1. Stages in the development of animal behavior correspond to
(a) the fifth law of dialectic materialism (b) stages in the development of the nervous system (c) stages in the phylogenetic scale (d) the separation of maturation and learning (e) the destruction of the myelin sheath.
- 2. Highly complex forms of integrated behavior
(a) only result from learning (b) distinguish the behavior of new-born infants (c) never appear in babes (d) may be the result of maturation (e) always serve for the preservation of the species.
- 3. The effect of birth on maturation is
(a) to stop it (b) to accelerate it (c) to retard it (d) slight (e) large but variable.
- 4. The process of maturation ceases
(a) at the birth of the individual (b) when the individual begins to learn (c) at some unknown time in the life of the individual (d) after the child is 311 hours old (e) at the age of 125 days.
- 5. Maturational phenomena depend chiefly upon the development of
(a) the environment (b) the parent (c) the organism (d) the temperature (e) the water supply.
- 6. The development of responses in the human infant is
(a) from general to specific (b) from specific to general (c) from specific to specific (d) still completely mystifying to investigators (e) determined by chance.
- 7. The development of the behavior of the human infant before birth
(a) is in the opposite direction from that of the guinea pig before birth (b) shows marked difference from the development after birth (c) is from imperfectly coordinated mass responses to specific reflexes (d) is from specific reflexes to imperfectly coordinated mass responses (e) is dependent entirely upon the endocrine glands.
- 8. The connection between two neurones is called
(a) an effector (b) a synapse (c) the after-discharge (d) myelinization (e) decussation.
- 9. The threshold is
(a) the lowest stimulus intensity which will arouse a response (b) the part of the response from first arousal until maximum intensity is reached (c) the part of the spinal cord where afferent and efferent nerves connect (d) the average distance between the touch end-organs and the temperature receptors (e) the opening through which the optic nerve enters the eye.
- 10. Two stimuli, each of which is too weak to produce a response singly,
(a) become conditioned when they occur together (b) never produce a response when they occur together (c) are called "equivalent stimuli" (d) are said to possess a "final common path" (e) may summate and elicit a response.

Chapter IV

Try to answer these questions before you read Chapter IV.

1. What is a drive?
2. What is the basis for our wanting to do something?
3. What is the basic difference between fear and curiosity functioning as drives?
4. How could you measure how hungry a child is?
5. What are the basic internal factors that determine the strength of your responses to external stimuli?
6. What is going on inside of you when you are hungry?
7. Which motives are universal? Give reasons for your opinion.

CHAPTER IV—THE SIMPLER MOTIVES

- I. The term motive is applied to all basic action tendencies, drives.
- II. The description of development from generalized responses to specific acts has been chiefly in terms of response to external stimulation.
 - A. Responses depend on the thresholds of the structures involved as well as on the stimulus.
 1. Thresholds are variable.
 2. Glandular secretions may act to raise or lower thresholds for various kinds of responses.
 - B. The internal factors which guide responses must be considered.
- III. Glands are composites of cells specially active in the secretion of fluids and may be related to motives through their functioning.
 - A. Kinds of glands:
 1. Some glands are provided with ducts which lead the secretions to particular points.
 2. The endocrine or ductless glands secrete products directly into nearby tissues, from which they are collected and circulated by the blood and lymph.
 - B. Functioning of some ductless glands:
 1. The thyroid gland secretes thyroxin, a substance rich in iodine.
 - a. Failure to take in enough iodine may lead to goiter, thyroid enlargement.
 2. An extreme of thyroid defect is the cretin.
 - (1) Cretins are slow, unexcitable, show lack of mental development.
 - (2) If treated medically from birth, deficiency may be partially overcome.

- c. Excess of thyroid secretion often leads to agitation, excitement.
 2. The parathyroids are concerned with the body's use of calcium.
 - a. The parathyroids seem connected with emotional stability.
 - b. People with parathyroid deficiency are restless and agitated to an extreme degree.
 3. The gonads are important in both physical and psychological sexual development.
 - a. Other glands cooperate in guiding normal sexual development.
 - b. The pineal and pituitary glands are among those involved.
 - c. The atrophy of the thymus gland during the "teens" is important for the development of the gonads.
 4. The adrenal glands are discussed later in connection with the arousal of strong emotions.
 5. Glands do not function in isolation, they interact.
- C. Relation between emotional traits and glandular make-up:
 1. There is usually a circular relationship between emotional traits and glandular functions.
 2. It is not likely that personality is entirely determined by the endocrine glands.
 3. In some cases it seems that emotional characteristics help to determine glandular functions.
 4. Chemical effects such as those involved in the functioning of the endocrines affect the whole body, and general aspects of behavior are affected more than are specific acts.
- IV. Most of the basic motives involve both visceral changes and groups of reflexes governed by these visceral changes.
 - A. Most of the simpler motives depend on bodily rhythms.
 1. Hunger is a specific experience depending upon violent stomach contraction.
 - a. Stomach contractions are determined by substances carried in the blood stream.
 - b. Habitual acts are also important in the experience.
 2. Thirst is the response to water deficiency in the tissues.
 - a. Thirst is a matter of the body as a whole.
 - b. The experience of thirst is the direct result of local changes in the mouth and throat.
 - B. Some drives (e.g., fear, rage, disgust) are quickly aroused by external stimuli, and the chemical changes in the body come later.
 - C. Some drives (e.g., curiosity, desire for color and tone), though aroused by external stimuli, seem chiefly dependent upon the dynamics of the brain itself.
 - D. In addition to the mechanics and chemistry of the motives, learning and the entire external situation are important in the responses made.
- V. Satisfaction of a drive means the removal of the source of unrest or tension in the body.
 - A. Drives are satisfied with respect to specific stimuli.

- B. Many motives, unless one has learned how to satisfy them, simply produce restlessness.
- C. There are preparatory responses which bring the organism into relation with the stimulus which is capable of putting an end to the drives.
- D. The consummatory responses involve direct interaction between the organism and the stimulus in such a way that the drive is satisfied and activities are brought to an end.
- E. Some preparatory and most consummatory responses are inherited.
 - 1. Preparatory responses can be enormously changed by experience.
 - 2. Even consummatory responses can be altered by experience.
 - 3. Human instincts are always partly a matter of specific reflexes and partly a matter of social experience or learning.

VI. Human life is full of broad drives dependent upon both innate needs and social experience.

- A. Catalogues of motives have been drawn up but are not acceptable to all psychologists.
 - 1. A minimum list for most of the higher animals is suggested:
 - a. Hunger
 - b. Thirst
 - c. Sex behavior
 - d. Maternal behavior
 - e. Rest
 - f. Sleep.
 - 2. More complicated social interests and activities are sometimes the product of many motives acting at once.
 - 3. For some motives the physiological bases are fairly well known.
 - 4. Though the simpler visceral drives may be involved in more complicated things, the brain itself seems to be the basis for some of the most profoundly motivated activity.
- B. Human motivation is almost infinitely complex.
 - 1. Man is extremely plastic and modifiable.
 - 2. Experience modifies the expression of the motives.
 - 3. For an understanding of motivation, it is important to keep physiological facts as the frame of reference.

Name Section Date

Do these exercises after you have read Chapter IV. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

—1. Motives are "satisfied" only in relation to

(a) the time of day (b) a specific stimulus (c) chemical state of the blood (d) the restlessness of the animal (e) the color of the food.

—2. Periodic increases in the restlessness of an animal are usually attributable to

(a) rhythmically recurring organic conditions (b) thoughts of food (c) the curiosity instinct (d) innate consummatory responses (e) inadequate stimuli.

—3. Animal drives and motives have frequently been investigated by

(a) weighing the animal (b) measuring general activity (c) getting subjective reports (d) putting the animals in chloretone (e) measuring the size of the pituitary glands.

—4. Gross total activity gives an indication of a motive's

(a) universality (b) innateness (c) intensity (d) usefulness (e) origin.

—5. Removal of the pituitary or adrenal glands causes

(a) disappearance of stomach contractions (b) nest building activity (c) goiter (d) loss of the instinct of curiosity (e) decrease in general activity.

—6. Hunger is

(a) simply a mechanical matter (b) a generalized state of discomfort (c) merely a mental phenomenon (d) a specific sensation from the digestive tract (e) never completely eliminated as an experience.

—7. The injection of blood from a starving dog into one which has just eaten caused the latter to

(a) die (b) undergo chromatolysis (c) begin eating again (d) develop rabies (e) perspire profusely.

—8. Hunger pangs have been found to coincide with

(a) activity of the thymus gland (b) changes in blood temperature (c) activity of the pineal gland (d) stomach contractions (e) rise in the adrenin content of the blood.

—9. Thirst is the direct result of

(a) general body condition (b) accumulations of cocaine in the throat (c) restlessness of the animal (d) local changes in mouth and throat (e) hypertrophy of the salivary glands.

—10. Glands which secrete directly into the blood stream are called

(a) sebaceous glands (b) endocrine glands (c) cretins (d) vestibular glands (e) scotomata.

—11. The glands of internal secretion

(a) account for all personality differences (b) maintain a complicated balance (c) are activated by kinesthetic neurones (d) atrophy in humans after the age of twelve (e) are located in the back of the throat.

—12. The increase in gonadal activity at puberty (period of sexual maturity) is in part due to

(a) decrease in the opposing activity of the thymus gland (b) maturation of the

cerebrum (c) increase in bodily dehydration (d) atrophy of the sacral division of the autonomic nervous system (e) atrophy of the cranial division of the autonomic nervous system.

—13. Delayed atrophy of the thymus may

(a) cause a premature development of the gonads (b) account for the relationship between twins (c) delay development of the grasping reflex (d) prevent senescence (e) cause a delayed adolescence.

Chapter V

Try to answer these questions before you read Chapter V.

1. What is an emotion?
2. What makes one person more "emotional" than another?
3. What is happening inside of a person who is giving external evidence of being very angry?
4. How can we differentiate between two emotions such as fear and rage?
5. What are the differences in the emotions of a baby two weeks old and of a child ten years old?
6. What is the real meaning of "childish" when applied to emotional patterns?
7. How many feelings can you experience at one time?

CHAPTER V—EMOTIONS AND FEELINGS

- I. Emotions can be distinguished from motives (the discussion refers to consummatory responses as opposed to preparatory).
 - A. Motives point in the direction of a specific body need.
 1. Situations may be normal, peaceful.
 2. Body functions are such as breathing, circulating, secreting, digesting.
 - B. Emotions involve a disturbance of bodily functioning suddenly imposed.
 1. Situations may be such that the organism must struggle, make a violent reaction to the environment.
 2. Though many violent responses can be listed, the most obvious are fear, rage, and intense pain.
 - C. As with the study of motives, it is desirable to keep our bearings in terms of physiological facts.
- II. Part of the nervous system is organized into a functional system which controls the responses of the vital organs and the smooth musculature; this division is called the autonomic nervous system, and has three major subdivisions.
 - A. The cranial and sacral divisions control the activity of the body in peaceful situations.
 1. They work harmoniously together.
 2. They are the chief physiological basis for quiet, smooth-running activities, e.g., digestion.
 - B. The sympathetic division is important in struggle situations.
 1. The sympathetic division supplies nerve fibers to the same organs as do the cranial and sacral divisions but it has an effect opposite to theirs.
 - a. When the sympathetic division is stimulated it impedes the

activities which the cranial and sacral divisions may have been directing, e.g., digestion may stop.

2. In addition to its effect on the various vital organs, the sympathetic division innervates the adrenal glands.
 - a. The adrenal glands manufacture a substance called adrenin.
 - b. When stimulated by the sympathetic division, the adrenals secrete great quantities of adrenin in the blood stream.
 - c. The adrenin liberates additional supplies of sugar from the liver to be used by the body as fuel.
 - d. The adrenin also involves a chemical change in the blood which makes it clot more readily when exposed to air.
 - e. The effect of adrenin in the blood stream is about the same as the direct stimulation by the sympathetic fibers.
 - (1) The effect of the adrenal glands is thus to reinforce the struggle activities in the body.
 - (2) Experimental removal of one of the adrenals results in a great reduction in the length of time during which an animal can put up a struggle.
 - (3) The facts of the physiological changes involved in struggle situations should be related, for many psychologists, to the emotion as it is experienced.

III. Two theories, one a "peripheral" and one a "central" theory, have been advanced.

- A. The James-Lange (peripheral) theory suggests that emotion as we experience it is simply our experience of the activities of the vital organs and muscles.
- B. Experiments on animals show inadequacies in the James-Lange theory.
 1. Cutting nerve fibers in a dog, depriving it of all visceral sensations, did not cause the animal to discontinue making emotional responses.
 2. Cutting nerve fibers which innervated the visceral organs (the sympathetic system) also failed to deprive the animal of emotional responses.
 3. The three very different emotions of fear, rage, and intense pain produce just about the same changes in the vital organs.
- C. Cannon and his collaborators have concluded that emotion is a function of a particular part of the brain stem (central theory).
 1. Patients suffering from a disease of the thalamus showed profound changes in feeling and emotion.
 2. Systematic animal experimentation found a small region in the diencephalon (the between-brain) which seemed to be the seat of the emotions.
 - a. Parts of the brain above it could be removed without interfering with the expression of rage.
 - b. When this part was cut into, the emotional disturbances seemed to disappear.

c. It seems that the action of the cerebral hemispheres is to hold emotions in check.

D. The effect of the vital organs on the emotions was studied by injecting adrenalin (the commercial product equivalent to adrenin) into human subjects.

1. Some subjects experienced no emotion.
2. Some subjects experienced a "cold" emotion, feeling "on edge" as if they were going to have an emotion.
3. Some subjects experienced regular emotions.
4. Apparently the physiological changes resulting from the activity of the adrenal glands do play a part in the emotions.

E. Probably every emotion may be said to depend both upon sensations from the vital organs and striped muscles and upon the activity of the brain stem.

IV. There do seem to be behavioral differences which distinguish the emotions from one another.

A. Emotional patterns are not sharply distinct at the beginning of life in humans.

1. Total response patterns of fear, rage and intense pain overlap a good deal.
2. A general upset condition is the major part of the patterns expressed by infants.

B. As children grow, the different emotional patterns appear.

1. This is due in part to maturation.
2. Social training plays a large rôle in the development of characteristic patterns.

C. Emotional expression includes a general aspect together with a specific aspect.

1. In mild emotional situations, the general aspect is most readily perceived.
2. In extreme emotion the general aspect reaches an extreme of disorganization.
 - a. Intense emotions are characteristically harder to distinguish than milder ones.
 - b. All the emotions, when they are intense, strongly resemble one another in physiological expression.
 - c. Intense emotion and intense effort come to the same thing as far as their objective manifestations are concerned.
3. In the middle range, the general aspect, or all-around disturbance, is less prominent than the specific reactions.
 - a. It is only in the middle range that emotion seems biologically efficient.

(1) Little emotion produces no action.

(2) Too much emotion makes one impotent for action.

D. Laboratory experiment demonstrated a fairly uniform and definite physiological pattern in fear.

E. Social training is important in our acquisition of skill in identifying emotional expressions.

V. "Affect" is a general term which includes the whole feeling life—the degree of pleasantness-unpleasantness, or of emotion, characterizing experience.

A. There are certain processes, not really sensations, which sometimes result in feelings of pleasantness and unpleasantness.

1. These feelings may occur in connection with or independently of emotions.
 2. Feelings are usually not localized in space.
 - a. Feelings may be localized within or outside the body.
 - b. They tend to spread out and seem to belong to the object which occasion them.
 3. No physiological changes have been found which always go with particular feelings.
 - a. Electrical changes in the body vary roughly with intensity of feeling.
 - b. This indicator, however, cannot distinguish between pleasant and unpleasant.
 4. We can probably not experience more than one feeling at a time.
 - a. There may be alternation of unpleasure and pleasure.
 - b. There may be a fusion, with a resultant of a smaller amount of the dominant feeling tone than would be ordinarily experienced.
 5. In general, those activities in the body which give rise to pleasantness are smoothly running, unchecked activities.
 6. Those activities which give rise to unpleasantness are blocked or inhibited activities.
- B. It appears that the brain center for the emotions is also the center for the feelings.
1. This center is easily accessible to stimuli from striped and unstriped muscles and from the skin and vital organs.
 2. The center may sometimes be directly acted upon:
 - a. By disease
 - b. By chemical or mechanical stimulation.
 - (1) Under these conditions pleasantness or unpleasantness may be directly aroused.

Name Section Date.....

Do these exercises after you have read Chapter V. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

- 1. The central nervous system consists of
(a) the cerebrum (b) the brain stem (c) the brain and spinal cord (d) the connections of the sense organs of smell, taste, sight, and hearing (e) the gray matter of the nervous system.
- 2. The cranial and sacral divisions of the autonomic nervous system
(a) oppose each other (b) cooperate with each other (c) cooperate with the sympathetic division (d) cause secretion of adrenin into the blood stream (e) increase the heart rate.
- 3. The cranial division of the autonomic nervous system tends to
(a) regulate the bladder (b) diminish activity of the adrenal glands (c) diminish rate of heart beat (d) stop digestive movements of stomach (e) dilate pupil of the eye.
- 4. Adrenin liberated into the blood stream during great excitement augments the changes effected by the
(a) cranial division of the autonomic nervous system (b) sympathetic division (c) sacral division (d) cerebellum (e) galvanic skin response.
- 5. Placing an intestinal muscle in blood from the adrenal vein of an excited animal
(a) kills the muscle (b) inhibits its activity (c) has no effect on the activity unless the blood is from the same animal as the muscle (d) increases the activity of the muscle (e) results in rapid fatigue of the muscle.
- 6. The injection of adrenalin into human subjects caused
(a) temper tantrums (b) nothing (c) variable effect with different individuals (d) full-blown emotions in all subjects (e) "cold" emotions in all subjects.
- 7. The blood of a "frightened" animal shows
(a) increased blood sugar and increased adrenin (b) decreased blood sugar and decreased adrenin (c) increased blood sugar and decreased adrenin (d) decreased blood sugar and increased adrenin (e) no change in either blood sugar or adrenin.
- 8. In intense pain the activity of the body is largely controlled
(a) by the cranial division of the autonomic nervous system (b) by the sympathetic division of the autonomic nervous system (c) by the sacral division (d) by the twelve cranial nerves (e) by the musculature of the stomach.
- 9. The effect of "startle" upon breathing is
(a) not noticeable (b) momentary checking followed by acceleration (c) characterized by a long expiratory movement (d) momentary checking followed by normal breathing (e) immediate acceleration of the breathing.
- 10. Distinctive emotional patterns may exist
(a) in the middle range of intensity (b) only in the case of very intense emotion (c) at the threshold of the emotions (d) in mild emotional states (e) in primitive man but not in civilized man.
- 11. The effect of a barking dog brought near a resting cat is to cause in the cat

- (a) increased blood pressure in the limbs (b) increased blood pressure in the viscera
(c) increased peristalsis (d) increased flow of saliva (e) decreased perspiration.

—12. Observers judging the emotional reactions of infants seemed to judge mainly on the basis of

- (a) the stimulus (b) the infant's bodily reaction (c) the infant's facial expression
(d) the infant's cries (e) the distinction between fear and rage.

—13. According to the James-Lange theory, emotion is

- (a) the stimulus for visceral activity (b) the experience of a mass of bodily sensations
(c) controlled by a spot in the diencephalon (d) a function of the brain as a whole (e) directed by the cerebral hemispheres.

—14. On the basis of work on removing parts of the brain, Cannon concludes that emotion is

- (a) a function of the cerebrum as a whole (b) the function of the frontal area of the cerebrum
(c) a function of a center in the thalamus (d) our experience of a mass of sensations from the viscera
(e) absent in decerebrate animals.

—15. Removal of the cerebral hemispheres of dogs

- (a) removes emotions (b) decreases emotions (c) has no effect on emotions (d) increases emotions
(e) kills the animal.

—16. The conclusion that emotion is a function of a particular part of the brain

- (a) is impossible (b) is a survival of the old "faculty" psychology (c) is called the peripheral theory of the emotions
(d) is the result of much careful operative work on animals (e) is derived chiefly from the work of child guidance clinics.

—17. The term "feelings" refers to

- (a) sensations of the skin (b) the emotions (c) pleasure-unpleasure qualities of experience
(d) approach or withdrawal responses (e) sympathetic reactions.

—18. Physiological investigation of the feelings has

- (a) found a characteristic decrease in pulse rate (b) found specific changes which differentiate the feelings physiologically
(c) disproved the possibility of the presence of more than one feeling at a time (d) arranged a scale of feelings from intense pleasure to unpleasure, with physiological correlates paralleling this exactly
(e) has not resulted in any conclusive evidence for physiological differentiation of the feelings.

Chapter VI

Try to answer these questions before you read Chapter VI.

How is it possible to measure degrees of emotional reaction?

What is the relationship between blushing and what a person is feeling?

What would you look for if you wanted to find out how "emotional" a person was?

How would you go about finding the true feelings behind a "poker face"?

What instrument would you find most useful in discovering when a man is bluffing?

CHAPTER VI—THE MEASUREMENT OF EMOTIONS AND FEELINGS

I. Measurement of emotional response means measurement of bodily changes accompanying emotions.

A. Emotions vary in intensity.

B. Measurements can be made of the accompanying bodily changes.

1. Most of the bodily changes measured depend on the autonomic nervous system.

2. Emotions depend largely on a portion of the brain stem.

C. Numerous bodily changes have received the attention of experimenters:

1. Pulse rate.

2. The force of the heart beat, studied by use of the electro-cardiograph.

3. Changes in blood pressure, studied by use of the sphygmomanometer.

a. Systolic blood pressure is the pressure when the arteries are subjected to the maximum pressure, due to the contraction of the heart.

b. Diastolic blood pressure is the pressure when the relaxation of the heart has caused arterial pressure to reach its lowest point.

4. Changes in the distribution of blood causing variations in the volume of the limbs, studied by use of the plethysmograph.

5. Changes in breathing, studied by use of the pneumograph.

a. The inspiration-expiration ratio, the ratio between the time taken to inhale and the time taken to exhale, is an oft-used measure.

b. Normally the inspiration-expiration ratio is about 1:4; during intense emotion it may rise to 1:2 or even 1:1.

6. Change in the galvanic skin reflex, the resistance of the skin to the passage of an electrical current.

a. With increased emotion the resistance decreases.

b. The increase in the secretions of the sweat glands, controlled by the autonomic nervous system, accounts for the reduction of the resistance.

- D. Such measurements do not give perfect agreement with the subject's report of the intensity of the emotional experience, but the relationship is rather close.
1. The physiological changes measured are not those which are most directly related to the experience of the emotion.
 2. The changes measured are those which follow upon the arousal of the emotional state.
 3. If several measures are taken in conjunction, a fairly good picture can be obtained.
- E. All of the indicators used in the study of emotions and feelings may vary due to causes other than those we are interested in; however, it may be assumed in a carefully controlled laboratory experiment that the variations in the measures will be due to the emotion which is being aroused.
- F. When used separately, these indicators are unreliable; when used in conjunction, they are quite satisfactory clues to emotional life.
- II. The free association test has been found to be a useful adjunct to studies of the emotions.
- A. The test consists of reading a series of words to the subject, who responds in each case with the first word that comes to mind.
 - B. A number of indications of emotional associations are manifested.
 1. The response words may give direct clues to the emotional difficulties.
 2. Other "complex indicators" may appear:
 - a. Blushing, sighing
 - b. Repeating the stimulus word or pretending not to have understood it
 - c. Taking an extraordinarily long time to make a response.
 3. No one indicator is taken as a diagnostic sign, but they do yield valuable clues, especially for the study of abnormals.
 - C. The free association test can be used in connection with any of the measures of bodily change.

Name Section Date

Do these exercises after you have read Chapter VI. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

- 1. Changes in the volume of a limb can be measured with a
(a) kymograph (b) polygraph (c) plethysmograph (d) ergograph (e) sphygmograph.
- 2. Breathing rate is usually recorded by using
(a) plethysmograph (b) sphygmomanometer (c) psychogalvanograph (d) pneumograph (e) free association test.
- 3. The normal inspiration-expiration ratio is
(a) 1:1 (b) 1:2 (c) 1:3 (d) 1:4 (e) 1:8.
- 4. The observation of a "complex indicator" in a free association test is
(a) proof that the subject is lying (b) a possible clue to the emotional life (c) not meaningful unless it accompanies uncommon response words (d) evidence that the subject is mentally defective (e) sure to be followed by an emotional outburst.
- 5. The galvanic skin reflex is
(a) the dilation of the pupil in fear (b) the change of the electrical resistance of the skin (c) due to electrical discharge of the motor neurones (d) due to electrical discharge of the sensory neurones (e) mainly used in determining the sensitivity of the skin to weak electric currents.
- 6. The galvanic skin reflex is
(a) useful as a rough measure of emotions (b) a very fine measure of the emotions (c) always observed before an emotional experience (d) a recent evolutionary development (e) due entirely to the central nervous system.
- 7. The galvanic skin reflex is probably closely related to
(a) hardening of the arteries (b) increase in the electrical discharge of the skin neurones (c) secretion of sweat (d) contraction of the pores of the skin (e) consonance.
- 8. Three physiological processes which have often been used as indicators of emotion are
(a) the galvanic skin reflex (b) latency of the knee-jerk (c) nerve frequency (d) respiratory index (e) after-discharge (f) pulse rate (g) myxoedema.

Chapter VII

Try to answer these questions before you read Chapter VII.

- Do we respond to everything that goes on about us? Give reasons for your opinion.
What has the nervous system to do with the things we respond to?
Can we experience cold and warm at the same time?
Deaf people are said to "feel" sounds. How do you explain this?
What sensations are involved in drinking a cup of coffee?
How can you taste a "sweet and sour" sauce?

CHAPTER VII—THE SIMPLER SENSES

- I. As organisms are in constant interaction with their environment, psychology includes the study of the sense organs and their functions.
 - A. The body is constantly stimulated by physical energy of many kinds.
 1. A stimulus is anything producing a response; stimulation is the action of physical energy upon the organism so that a response is evoked.
 2. Stimulation depends upon the sensitivity of the organism to the particular form of physical energy.
 3. The responsiveness to stimulation involves selection of a few stimuli from a complicated pattern of things outside the body.
 - a. Relatively few kinds of energy provoke specific responses.
 - b. Classification of modes of stimulation is in terms of the kinds of energy which can act as stimuli upon the kinds of bodies which have developed in the course of the evolution of the race.
 4. In the course of evolution, some cells have developed so that they have low thresholds—are specially sensitive—to stimuli of particular kinds, as compared with other kinds of energy which act upon other cells.
 - B. Stimulation involves excitation of nerve fibers.
 1. Nerve fibers are subject to the "all-or-none" law; a fiber must respond with its whole capacity for response, or not respond at all, when stimulation is applied.
 - a. In nerve action, after a moment of excitation, there is a refractory phase in the nerve, a period during which the nerve cannot conduct.
 - b. The refractory phase is very brief, so that ordinary excitation of a nerve involves the passage of waves of excitation traveling along the fiber, each wave moving along at a constant rate of speed.

- c. The speed at which the wave travels does not vary with the stimulus, but the refractory phase may be shortened by an increase in the intensity of the stimulation.

- (1) The period between the waves is shorter.

- (2) More waves pass or arrive at a given point per unit of time; though the speed of individual waves has not been altered, the frequency of the waves is greater.

- 2. The intensity of a sensation depends upon two factors:

- a. The frequency of impulses (waves of excitation) in the nerve fiber—the *Adrian principle*

- b. The number of nerve fibers excited.

- 3. The qualities of sensations are the result of special and localized activities in the brain.

- a. Qualitative differences involve the doctrine of specific energies of nerves, that the differences between sensations are not in nerve action but in the specialization within the brain.

- b. Distinction is made between making reflex reactions to sights and sounds, and the visual and auditory qualities of experience.

- c. The physical basis for the distinction, e.g., between red and green, is that the sense organ is so specialized that nerve fibers responding to red and green stimuli lead to different parts of the brain within the visual area; there are brain centers for each of the different types of stimulation to which the body is sensitive.

- II. Every sense organ is a group of cells specially sensitive to particular kinds of energy, particular modes of stimulation.

- A. The skin contains several different types of sense organs.

- 1. Contains four senses:

- a. Touch

- b. Warmth

- c. Cold

- d. Pain.

- 2. Touch spots are more numerous than either warm or cold spots, and pain spots are still more numerous.

- 3. At high temperatures, not only the warm spots, but the cold spots as well, can be stimulated.

- a. If several warm and cold spots in a given region are stimulated simultaneously, the result will be the experience of heat.

- b. If a cold spot is stimulated by a warm stimulus (without stimulation of warm spots) the experience is that of ordinary cold.

- (1) This phenomenon is called "paradoxical cold."

- (2) Consider in this connection the doctrine of specific energies described in I, B, 3 above.

- 4. There seems to be a skin vibratory sense by means of which the deaf may be trained to distinguish words by recognizing patterns of intensity of speech within the words (amplifying apparatus is used).

5. Many qualities can be distinguished by the skin, in addition to the elementary ones listed, owing to the response of the organism to patterns of stimulation involving sensations from different sources.
 6. The physiological bases for the skin senses have not yet been discovered.
- B. Organic sensations are derived from the vital organs.
1. Sensations such as those received from the skin senses are probably aroused within the body in much the same way as they are on the skin.
 2. Other organic sensations (e.g., hunger, thirst, sex, etc.) may be compounds of simpler sense qualities.
 3. It is uncertain whether the experiences of nausea and fatigue are accounted for by the four simple cutaneous senses.
- C. The kinæsthetic sense organs are located in muscles, tendons, and joints.
1. Motion serves to stimulate these sense organs.
 2. They give awareness of bodily position and movement.
 3. Distance can be judged by the kinæsthetic sense.
 - a. The slower the movement, the greater the apparent distance.
 - b. The kinæsthetic sense is inferior to vision in judging distance.
 4. Locomotion, maintenance of posture, and the execution of skilled acts depend upon kinæsthetic impulses.
- D. The sense of smell resides in the olfactory lobe.
1. The sense of smell is very old in the history of the race.
 - a. The "modern brain" appeared in evolution first as a "nose brain."
 - b. Specialization in discrimination among chemical stimuli was the start of the "modern brain" in all species higher than the fish.
 - c. As the modern brain developed, old functions localized in the brain stem moved forward, developing centers for their specialization in the new brain.
 - (1) The old centers remain.
 - (2) Sight and hearing have undergone specialized development along with the development of the brain.
 - (3) The more primitive arrangement serves for the sense of smell.
 2. Smell is more subject to quick adaptation (reduced sensitivity due to continued stimulation) than any other sense.
 3. It has been found possible to group the simple odors in six main groups:
 - a. Flowery
 - b. Foul
 - c. Fruity
 - d. Spicy
 - e. Resinous
 - f. Burnt.

4. An odor may resemble two or three of the six main types of odors.
- E. A large part of what is called taste is simply smell.
 1. The tongue is equipped with large numbers of little pits in its surface called papillæ.
 - a. Within the papillæ are the taste buds.
 - b. Within the taste buds are the taste cells which set going the taste impulses in the sensory nerves.
 2. There are four fundamental taste experiences:
 - a. Sweet
 - b. Sour
 - c. Bitter
 - d. Salty.
 3. The fundamental taste qualities are dependent upon specialized taste cells.
 - a. The taste cells for salty are scattered.
 - b. The cells at the tip of the tongue are mostly responsive to sweet.
 - c. The cells on the sides of the tongue are mostly responsive to sour.
 - d. The cells on the back of the tongue are mostly responsive to bitter.
 4. Most tastes are combinations of various of these elementary sensations, plus the sensations aroused by stimulation of receptors of the sense of smell, touch, warmth, and cold.

Name Section Date

Do these exercises after you have read Chapter VII. Select the most satisfactory of the alternatives presented and place its letter on the line provided at left.

—1. A nerve fiber responds

(a) to stimuli below the threshold (b) only to visual stimuli (c) with its whole capacity or not at all (d) only when stimulated by another nerve fiber (e) with a different type of response for each type of stimulation.

—2. The "all-or-none" law states that

(a) a stimulus arouses all the fibers of the nerve or none of them (b) a nerve fiber responds with its whole capacity for response or not at all (c) in order to perceive heat we must stimulate all the warm spots or none of the cold spots of a given area (d) the galvanic skin response is either maximum or zero (e) the ear can accurately localize all sounds in the vertical plane while no sound in the horizontal plane can be localized perfectly.

—3. Grading of the intensity of response of a nerve is made possible through variations

(a) in the potential of the impulse generated (b) in the specific part of the individual fiber stimulated (c) in the number of stimulated fibers in the nerve trunk (d) in the action of the skeletal musculature (e) in the length of fiber stimulated.

—4. According to the Adrian principle, the frequency of impulses along a nerve fiber is

(a) constant (b) dependent on the intensity of the stimulus (c) maximum for any fiber if the fiber responds at all (d) controlled by resonance (e) about the frequency of the lowest audible sound.

—5. The intensity of pain sensations corresponds to

(a) the experience of paradoxical cold (b) the size of the two-point threshold (c) the frequency of discharge of the nerve fiber (e) the distance of the spot stimulated from the brain.

— — — —6. The four skin senses are

(a) touch (b) heat (c) warmth (e) softness (f) hardness (g) cold (h) pain (i) paresthesia.

—7. The skin sense having the greatest number of receptors is

(a) warmth (b) cold (c) touch (d) pain (e) heat.

—8. Stimulation of a cold spot by a warm stimulus gives rise

(a) to alternation of warmth and cold sensations (b) to paradoxical cold (c) to paradoxical warmth (d) to heat (e) to sensations of lukewarm.

—9. The experience of heat is produced by stimulating

(a) warm and cold spots simultaneously (b) warm and pain spots alternately (c) warm spots with high thresholds (d) heat spots only (e) the pyramidal tract.

—10. Deaf people have been taught to distinguish sounds by means of the

(a) skin vibratory sense (b) patella (c) vestibular mechanism (d) tympanum (e) Stern variator.

—11. Movement of a limb

(a) cannot be detected if the eyes are closed (b) is reported by the thermal receptors stimulated by movements of the air over the skin surface (c) is detected by the irradiation of energy when stimulating the cortical motor centers (d) is perceived by the kinæstoscopic sense (e) is perceived by means of the kinæsthetic sense.

— — — —12. The four fundamental taste experiences are

(a) sweet (b) quinine (c) starchy (d) sour (e) bitter (f) burnt (g) salty (h) fatty (i) fruity.

—13. The taste receptors on the sides of the tongue are mostly sensitive to

(a) sweet (b) sour (c) salty (d) bitter (e) metallic sensations.

—14. The part of the cerebrum which evolved earliest in vertebrates is the

(a) smell center (b) optic region (c) cornea (d) thalamus (e) pons.

—15. Which of the senses below shows least modification in its connections with the brain, when we compare man with lower vertebrates?

(a) smell (b) cutaneous sensitivity (c) hearing (d) sight (e) organic sensation (f) kinæsthesia.

Chapter VIII

Try to answer these questions before you read Chapter VIII.

1. Name all the different qualities of sound.
2. What is happening in your ear when you are listening to a concert?
3. Just as there are colors we cannot see, there are sounds we cannot hear. How do you account for this?
4. What is a sound wave?
5. In what way is hearing related to touch?

CHAPTER VIII—HEARING

- I. Disturbances in the air give rise to the experience of hearing.
 - A. Every source of sound is a body in motion, vibrating.
 1. The vibrations may be conceived of as giving the air a series of blows.
 2. When struck, the air condenses at that point.
 3. After each blow, the condensed air thins itself out and there is a phase of rarefaction.
 4. In the meantime the pressure has been communicated to adjacent air particles.
 5. The next blow starts the sequence of condensation and rarefaction over again.
 6. The wave of condensation moves away from the resounding body at approximately a constant rate of speed.
 - a. The speed of sound is about 1100 feet per second.
 - b. Since the speed of sound is constant, we can measure wave lengths by discovering the frequency of the waves. (If the speed is 1100 feet per second and there are 256 vibrations per second, each wave must be about four feet long.)
 - B. Quantitative differences in sound waves give rise to differences in experience.
 1. The number of pulsations per second is important in the experience of hearing.
 - a. There must be fifteen to twenty pulsations per second before the experience of hearing occurs.
 - b. Vibrations having a wave frequency greater than about twenty-five thousand vibrations per second can no longer be heard.
 - c. These are respectively the lower and upper thresholds for tones.
 2. Rhythmical disturbances give rise to tone; non-rhythmical, to noise.
 3. The amplitude of the air wave, the actual amount of commotion in the air, is the basis for the intensity of a tone.

4. The frequency of the waves (the wave length, see A, 6 above) determines the pitch of the tone.
 5. The form of the air wave determines the timbre or quality of the tone.
 - a. Every sound has a fundamental tone.
 - b. Almost every resounding body gives off simultaneously various more rapid vibrations, overtones.
 - c. The combined effect of these various wave lengths represents the final form of the sound wave.
 - d. Differences in number or prominence of the different overtones represent the characteristic differences between musical instruments.
 6. Quality of a produced sound is affected by rhythmic pulsations in intensity and pitch.
 - C. There are large individual differences in sensitivity to sounds.
- II. The anatomy of the ear provides for a very complex type of function.
- A. The ear may be divided into three parts:
 1. The external ear funnels the sound waves and directs them against the eardrum (tympanum) which they set going in vibration.
 2. The middle ear:
 - a. The eardrum communicates the vibration to three little bones.
 - b. The bones of the middle ear are the hammer, anvil, and stirrup.
 - c. The bones magnify the vibrations and transmit them to the inner ear.
 3. The inner ear:
 - a. The bones of the middle ear set going vibrations in the fluid of the cochlea.
 - b. Wound about in the cochlea is the basilar membrane.
 - (1) Along the basilar membrane are hair cells.
 - (2) From the hair cells nerve fibers lead out to the brain.
 - (3) Different parts of the basilar membrane are specially sensitive to different vibration rates.
 - c. The vibration of the fluid of the cochlea sets in motion that part of the basilar membrane which is attuned to those vibration rates.
 - (1) The movement of the membrane stimulates the hair cells.
 - (2) Stimulation of the hair cells starts the impulses along the nerve fibers to the brain.
 - B. The auditory fibers from the right ear cross over and connect with the left temporal lobe of the brain; fibers from the left ear go to the right temporal lobe.
 - C. Localization of sound depends chiefly on the relative intensity at the two ears.
 1. When single clicks are given under experimental conditions, varia-

tion of the source from left to right permits very sensitive discrimination.

2. When the stimulus is in the plane where stimuli are equidistant from the two ears, large errors are made in the localizations.

III. A theory of hearing is a theory of how the basilar membrane works.

A. Among the various theories of hearing, the Helmholtz resonance theory has enjoyed great favor.

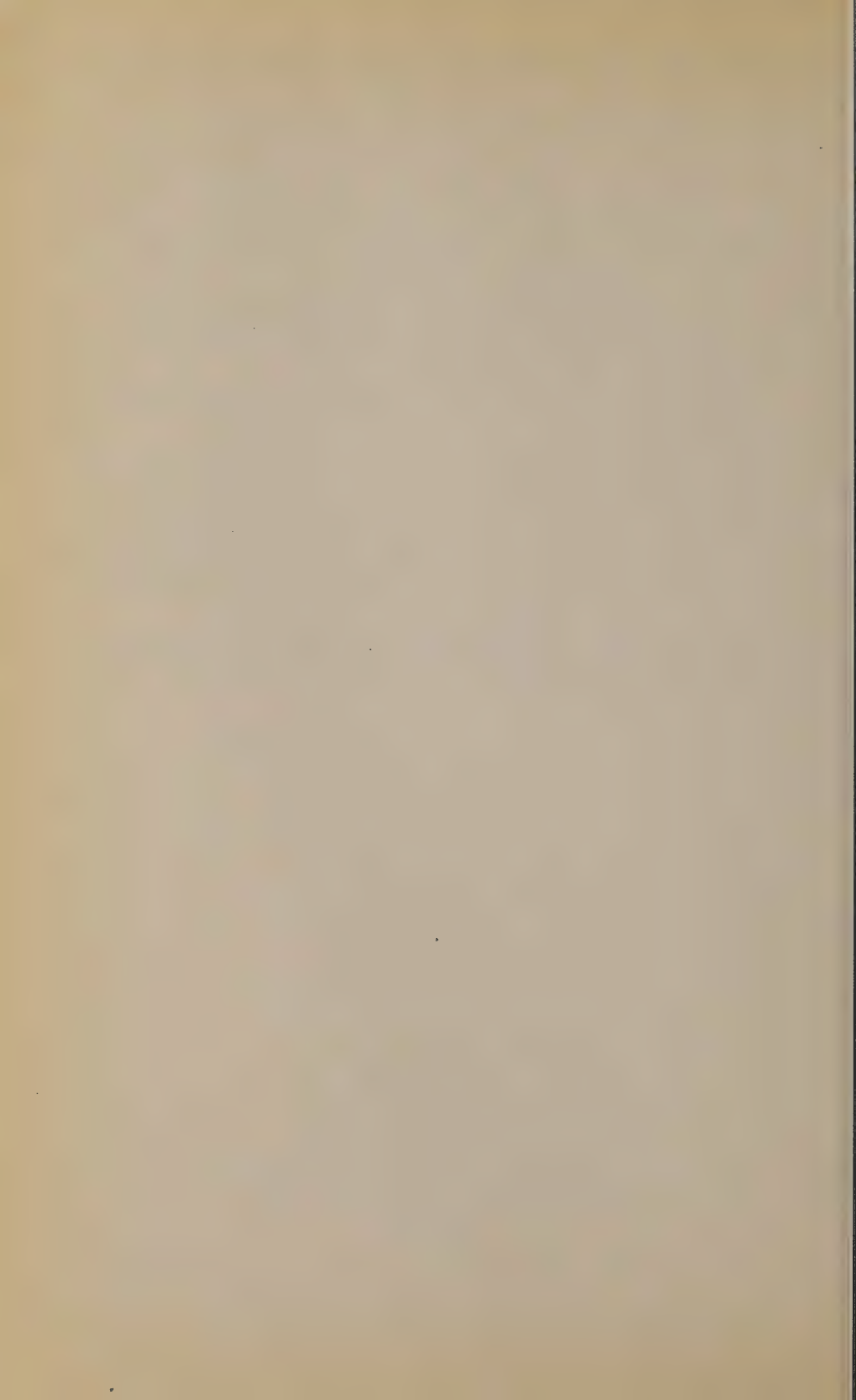
1. The theory states that parts of the basilar membrane act as separately tuned resonators which vibrate selectively (with "sympathetic vibration") in response to the frequencies transmitted by the bones of the middle ear to the cochlear fluid.
2. Instead of single fibers vibrating, probably a band of fibers is excited in the membrane.

- a. The longest fibers in the cochlea are only about three times as long as the shortest.

- b. To account for the wide range of pitch to which we are sensitive, we should expect greater variation in the fibers.

- c. This difficulty is taken care of by different loading and tension in the different parts of the cochlea which permit extraordinary variation of sensitiveness to pitch among the fibers.

B. The Adrian theory states that intensity of different tones is perceived in accordance with the variation in frequency rates of nerve impulses along the different fibers.



Name Section Date

Do these exercises after you have read Chapter VIII. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

—1. The sense organ of hearing is the

a) tympanum (b) basilar membrane (c) retina (d) corpora quadrigemina (e) cerebellum.

—2. Sound gets from the eardrum to the cochlea by means of the

a) bones of the middle ear (b) Eustachian tubes (c) semicircular canals (d) acoustic nerve (e) thalamus.

—3. The basilar membrane is in

a) the tympanum (b) the malleus (c) the middle ear (d) the vestibule (e) the cochlea.

— — —4. The three primary qualities of a sound wave are

a) saturation (b) pitch (c) confluxion (d) temerity (e) abulia (f) intensity (g) timbre.

—5. The determiner of the pitch of an audible tone is the

a) amplitude of the sound wave (b) temperature of the sound wave (c) complexity of the sound wave (d) kurtosis of the sound wave (e) frequency of the sound wave.

—6. The determiner of the intensity of an audible tone is the

a) temperature of the sound wave (b) complexity of the sound wave (c) amplitude of the sound wave (d) kurtosis of the sound wave (e) frequency of the sound wave.

—7. The determiner of the quality or timbre of an audible tone is the

a) amplitude of the sound wave (b) temperature of the sound wave (c) complexity of the sound wave (d) kurtosis of the sound wave (e) frequency of the sound wave.

—8. The Helmholtz resonance theory describes the fibers of the basilar membrane as

a) resonating as a whole (b) resonating to tones to which they are tuned (c) lacking a refractory phase (d) incapable of giving pure tones (e) resembling the strands of a telephone cable.

—9. The localization of sounds depends chiefly on

a) differences in thickness of the tympanic membranes (b) differences in the sound at the two ears (c) the angle at which the middle ear bones are inclined (d) size of the fenestra ovalis (e) the presence of beats.

Chapter IX

Try to answer these questions before you read Chapter IX.

In what ways does the eye function like a camera?

How do eyeglasses work?

Red objects at the edge of the field of vision appear gray. Try to explain this.

What do color-blind people see when they look at traffic lights?

What part does the brain play in the seeing of colors?

What is your eye doing as you are reading these questions?

What does speeding up in reading mean in terms of eye movements?

CHAPTER IX—SIGHT

I. The stimulus for seeing is light. The physical stimulus may be schematically conceived as a light wave.

A. Light wave is traveling \longrightarrow .

B. The wave motion is perpendicular to this line $\updownarrow\updownarrow\updownarrow\updownarrow\updownarrow$.

C. There may be several variations in light waves.

1. Waves may differ in wave length, as $\square\square\square\square$ compared with $\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup$.

2. Waves may differ in amplitude, as $\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup$ compared with $\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup$.

3. Waves may differ in purity, as $\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup$ compared with $\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup\sqcup$.

II. The organ for receiving light stimulations is the eye.

A. The eye is a sphere.

1. The front part contains the focusing apparatus:

a. The cornea

b. The iris

c. The lens.

2. The light waves are focused on the inner lining of the back of the eyeball, the retina.

B. The retina, which is the light-sensitive part of the eye, is not uniformly sensitive over its whole surface.

1. Near the center is the fovea, the spot of clearest vision.

2. The farther away from the fovea the light waves are focused, the less clear the vision.

3. The spot where the optic nerve meets the retina is the blind spot.

a. The blind spot is the point of the retina of least clear vision.

b. The blind spot is not absolutely blind.

4. In regarding an object or a view, normally, the eye constantly shifts its focus from one point to another.

C. The retina contains two types of receptor cells, cones and rods.

1. The cones are concentrated near the center of the retina and become more scarce toward the edges.
 - a. The cones came later in the evolution of the eye.
 - b. The cones function in ordinary daylight vision, but not in the dark-adapted eye.
 - c. The cones respond to color.
2. The rods are rare near the center of the retina, but as the cones become scarcer toward the edges, the rods become more numerous.
 - a. The rods are more primitive sense organs.
 - b. The rods function when the eye is dark-adapted.
 - c. The rods cannot respond to color, but distinguish, vaguely, forms and brightness.

D. The light-adapted eye responds to various differences in light waves.

1. Color depends on the length of the wave.
 - a. Speed of light is the same, no matter what the wave length.
 - b. Shorter wave lengths would then mean greater frequency waves in a given time.
 - c. Wave length is thus related to frequency: the longer the wave, the smaller the frequency; the shorter the wave, the greater the frequency.
 - d. Color may be described as depending on wave frequency.
2. Brightness depends on the amplitude of the wave, its energy.
3. Saturation depends on the purity of the light wave.

E. Most of the retina can clearly distinguish neither color nor form.

1. A small central circular zone can discriminate all colors and readily recognize forms.
2. A surrounding zone can discriminate blues and yellows and forms moderately well.
3. The outer zone receives only gray, and forms seen are very fuzzy.
4. These generalizations hold under ordinary conditions, not when intense illumination is used.
5. The color zones are not marked off by sharp lines.

III. There are several important special phenomena of color vision:

- A. The neutralization of colors by other colors, their complementaries.
- B. Negative after-images: turning to a gray field after fixating a color or seeing the complementary color.
- C. Color contrast: when fixating a color on a gray field observing the complementary color appearing as a border.
- D. Combinations of colors can produce white and any of the grays.
- E. In development, there are numerous differences in color sensitivity.
 1. In children below three, form seems more important than color; after that age, color is more important.
 2. By about four years of age, at least four or five color names are used.
 3. Adults can distinguish a hundred hues or more.
 4. Color-blindness afflicts many people, chiefly men.

- a. Red-green blindness is most common.
- b. There can be red-blindness or green-blindness alone.
- c. The color-blind do not simply confuse colors; they *lack* certain colors, and the rest of the spectrum extends through the band as if there were no such color.

V. There is no completely acceptable theory of color vision.

A. The Young-Helmholtz theory states that the retina contains three kinds of receptors.

- 1. Each receptor is maximally sensitive to a different wave length and partially sensitive to others.
- 2. The three receptors are maximally sensitive to red, green, and violet, respectively.
- 3. The theory does not seem to account for several psychological phenomena:
 - a. The psychological uniqueness of yellow and white.
 - b. The phenomena of color contrast and after-images.

B. The Hering theory states that three receptors serve for two colors each.

- 1. Opposite types of chemical change in one receptor are the responses of the receptor when stimulated by the colors to which it is sensitive.
- 2. The pairs of colors of each receptor combine to form gray; they are:
 - a. Red and green
 - b. Yellow and blue
 - c. White and black.
- 3. The theory attempts to explain the various psychological phenomena of color vision.
- 4. The theory requires a red and green which do not seem psychologically "pure" or "primary."

C. The Ladd-Franklin theory postulates chemical changes in the retina for seeing.

- 1. The theory suggests an evolutionary scheme.
 - a. White-black discrimination developed first.
 - b. The receptor for white, in time, became specialized to differentiate blue and yellow.
 - c. During the course of further evolution, the yellow receptor gave rise to substances sensitive to red and green.
- 2. It is similar to the Hering theory in involving chemical changes in the retina for seeing.

D. Both the Hering and the Ladd-Franklin theories put most of the "work" of color vision upon the retina.

E. Evidence has been presented demonstrating that the brain must play an important part in the seeing of colors (the Hecht box).

V. The eye is equipped with external muscles which pull it about in various directions.

A. Two kinds of eye movement may be distinguished, "sweeps" and "jumps."

- 1. Sweep or pursuit movement occurs *only* when a moving object is being watched.

2. Ordinarily, the eye moves with jump movements when regarding stationary objects.
- B. The psychology of reading is related to the details of eye movements.
1. Jumps usually take in an inch or two, and several pauses are made in reading a line of type.
 2. The eye sees only during pauses; during the jumps there is just blur, if anything.
 3. Several words are taken in during each pause.
 4. More efficient readers take in more per pause and make more jumps per minute.
 5. The eye swings back to the beginning of the next line.
 6. More time is spent on the first half of the line than the second half.
 7. Backward, retracing movements increase as the difficulty of the material increases.
 8. The eyes work in unison in all these movements, but generally one eye is dominant over the other.

Name Section Date

Do these exercises after you have read Chapter IX. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

1. The retinal structures important in the normal vision of the light-adapted eye are the
 - (a) myelin (b) rods (c) impingement (d) cones (e) Purkinje bodies.
2. The part of the retina giving clearest vision is
 - (a) the iris (b) the lens (c) the cornea (d) the fovea (e) the periphery.
3. The outer zone of the retina is
 - (a) totally blind (b) blind for colors of any intensity (c) blind for colors unless the intensity is high (d) blind to blue and yellow but not to red and green (e) normal perceiving colors but unable to discriminate brightnesses.
4. The blind spot is
 - (a) the spot where the optic nerve meets the retina (b) the point of the retina completely insensitive to visual stimuli (c) the part of the lens covered by the iris (d) the spot on which the periphery of the lens focuses (e) just above the fovea.
5. Forms falling partly on the blind spot are
 - (a) not seen (b) seen, but with the parts on the blind spot missing (c) seen, but with considerable distortion of form (d) seen normally in all cases (e) seen, but not received.
6. Color vision is primarily a function of
 - (a) the retinal rods (b) the retinal cones (c) the optic chiasma (d) the medulla longitudinalis (e) regions adjoining the fenestra ovalis.
7. The factor of the stimulating light wave which determines color is
 - (a) amplitude (b) homoscedosis (c) complexity (d) confluxion (e) frequency (f) wavelength (g) speed (h) asymmetry.
8. The factor of the stimulating light wave which determines brightness is
 - (a) amplitude (b) homoscedosis (c) purity (d) confluxion (e) frequency (f) level (g) speed (h) asymmetry (i) revolutions per second.
9. The factor of the stimulating light wave which determines saturation is
 - (a) amplitude (b) homoscedosis (c) purity (d) confluxion (e) frequency (f) level (g) speed (h) asymmetry (i) revolutions per second.
10. Unsaturated colors are colors
 - (a) near the red end of the spectrum (b) near the violet end of the spectrum (c) which are mixed with gray (d) which contain only one wave length (e) which have wave lengths lower or higher than those to which the eye is sensitive.
11. The retinal structures which make possible the seeing of objects in the dark are
 - (a) the cones (b) the blind spots (c) the red nuclei (d) the rods (e) Hering green and blue.
12. Mixing a color and its complementary on the color wheel gives
 - (a) gray (b) a negative after-image (c) a very saturated intermediate color (d) the complementary or the color, but highly saturated (e) purple.

—13. Studies of matching of colored forms show

(a) younger children match on the basis of form and older children match on basis of color (b) younger children match on the basis of color and older children match on the basis of form (c) young children are unable to perceive colors (d) young children are unable to perceive forms (e) we can see forms more clearly than colors at the periphery of the retina.

—14. Color blindness is

(a) common in women (b) an example of the all-or-none law (c) the inability to distinguish between red and blue (d) very complicated and as yet imperfectly understood (e) completely explained by the Ladd-Franklin theory.

—15. The most common form of color blindness is

(a) red blindness (b) green blindness (c) blue-yellow blindness (d) red-green blindness (e) total color blindness.

—16. According to the Ladd-Franklin theory, the first visual receptors to be evolved

(a) were part of the archipallium (b) distinguished color but not brightness (c) distinguished brightness but not color (d) distinguished saturation but not color (e) distinguished blue and yellow but not red, green, or gray.

—17. According to the Young-Helmholtz three-color theory

(a) all our color experiences are due to combinations of red, green, and blue excitations (b) the mind is incapable of perceiving objects having more than three colors (c) all our color experiences are due to combinations of red, yellow, and green primaries (d) mixing any three colors gives a gray (e) the mind is incapable of perceiving objects having less than three colors.

—18. In reading, the eyes usually move

(a) in a steady sweep (b) with the harmonic oscillation (c) in a series of long jumps and short fixation pauses (d) in short jumps with longer fixation pauses (e) so that each letter falls on the fovea during at least one fixation.

—19. The movements of the eyes in following an object swinging regularly from side to side are

(a) jump movements (b) pursuit movements (c) regressive movements (d) saccadic movements (e) vestibular compensatory movements.

—20. The number of retracing eye movements increases with

(a) the difficulty of the material (b) the angular velocity of eye movement (c) the distance from the fovea (d) age (e) the speed of reading.

Chapter X

Try to answer these questions before you read Chapter X.

- What do you really see when you look at a table? How do you know it is a table?
How does a room appear to a little child?
How does perception of a given visual field differ from the sensation of seeing the same field?
How can we tell when one object is nearer to us than another?
What does "tomorrow" mean to the little child?
Why does time sometimes pass quickly and sometimes slowly?
What is happening when a man sees "pink elephants"?

CHAPTER X—THE DEVELOPMENT OF PERCEPTION

- I. The distinction is made in psychology between sensing a thing and perceiving it.
 - A. Perception is the interpretation of a sensory stimulus.
 - B. Things are not sensed without being given some interpretation in the light of past experience.
 1. Colors are perceived as parts of a context.
 2. We usually see colors in terms of what we believe them to be.
 3. Demonstration is the phenomenon of color constancy, the fact that the experience of a given color may arise from entirely different wave lengths.
 - C. The newborn organism may receive raw sensations.
- II. Interpretation depends on the fashion of grouping and organizing sense impressions.
 - A. In color and brightness constancy, a single sensory stimulus is interpreted in the light of its surroundings and the attitude of the observer.
 - B. Ordinary objects to which we attend are more complex than a single stimulus.
 - C. The complex fields attended to are organized into compact wholes.
 1. Things are grouped in accordance with natural boundaries, space between them, etc.
 2. Things are grouped in accordance with our own habits.
 - a. We learn to perceive various objects as unified wholes.
 - b. The process of the unifying of sense impressions is the clue to the understanding of the difference between perception and sensation.
 - D. The act of seeing is an act of organizing retinal sense impressions.
 1. The brain responds to the retinal stimulations, making a unity of them.

2. Brain injury cases furnish some interesting material.
 - a. Patient may be blind in part of the visual field.
 - b. Stimuli may be presented so that they fall partly into the blind area.
 - c. The eyes would see the stimulus as a whole in spite of partial stimulation caused by the blinded regions.
 - d. If, as the result of the injury, the fovea had become non-functional, another part of the brain became the center of clearest vision, the pseudo-fovea, which became the functional center of the retina.
 3. Experience is so highly organized in seeing that change in one part may result in the reorganization of the entire field.
 4. When integration is impossible because of the different character of the stimuli presented before the eyes, we may see one thing or another, but ordinarily not both.
 - a. In experiments on retinal rivalry, e.g., exposing a red card before one eye and a green before the other in a stereoscope, the effects alternate.
 - b. We cannot perceive the two colors as being directly before us at the same time; first we see one, then the other.
 - c. The effect of habit on perception is illustrated by the dominance of the color before the dominant eye.
 - d. In everyday life we ignore much that is contrary to wishes and expectations, due to difficulty or impossibility of integration of such experiences.
- III. The development of a typical perception is in three stages: (1) an unanalyzed total is experienced; (2) separate sensations appear; (3) the sensory elements are combined and integrated.
- A. The earliest acts of perception seem to be total responses of the organism.
 1. Objects are seen by little children in terms of differentiation of background from foreground.
 - a. Foreground objects are what are called in adults the objects attended to.
 - b. Ability to differentiate develops with growth.
 - (1) Development is partly the result of experience.
 - (2) Development may be partly the result of maturation of the nervous system.
 2. The individual born blind and receiving sight as an adult as a result of a surgical operation does not know what he is seeing, yet the first objects seen are wholes.
 - B. The development of perception in early childhood involves analysis, the breaking up of the originally experienced unique field.
 1. At an early age the process of analysis is imperfect.
 2. Language plays a large part in the development of perceptual analysis.

- C. Experiment has demonstrated two tendencies in adult visual experience which illustrate the second and third stages.
1. There is the tendency toward disintegration, the breaking up of a figure into parts.
 2. There is the tendency toward completion, organizing a figure as a whole.
- D. Under special conditions, trained laboratory observers may be able to detach sensations from their context and describe pure elements.
1. Ordinarily the perceptual whole seems to alter the characteristics of the sensory elements.
 2. Sensations are derived from perceptions.
 3. The term sensation is properly applied only to the result of the special process of analysis involved in the second stage in the development of perception.
 - a. This may be achieved by going from the first to the second stage.
 - b. This may be achieved by going from the third back to the second stage.
- E. Distinction has been made between those acts of perception which result in patterns and those which result in blends.
1. A pattern is an organized whole in which we can still pick out the parts easily whenever we wish.
 2. A blend is a unique experience wherein we can recognize the general quality without being able to tell exact differences.
 3. The distinction corresponds to the difference between perception at the first and at the third stages.
 - a. Response at the first stage is a blend; it has never been analyzed, is not a synthesis.
 - b. Response at the third stage is a pattern; we have learned to experience the objects separately.
- F. Responses at the third perceptual stage involve the integration of separate sensations.
1. The integration, the grouping, of the stimuli may vary from moment to moment.
 2. The variation in the grouping depends in part upon interests and habits.
 3. Integration is frequently based on language.
 - a. Analysis often involves language.
 - b. Speech limits the capacity for analysis.
 - c. The development of concepts is in large part dependent upon verbal symbols.
 - d. The uses of objects, not only appearance, have determined the vocabulary.
 - (1) Observation is largely in terms of use.
 - (2) Genetic development of concepts is originally aided by

separating objects serving one purpose from the serving another.

IV. Experience is organized in tri-dimensional space.

A. We are not born perceiving one systematized spatial order.

1. We slowly learn to fit together miscellaneous sense impressions.
2. The different systems of space perception are far from perfectly integrated.

B. There are several cues by means of which distance of objects can be judged visually.

1. Some cues operate on each eye, other cues depend on the use of both eyes.
2. The adjustment which the lens makes in focusing objects on to the retina.
3. The superposition of one object on another.
4. Foreshortening due to distance.
5. Presence of haze and of shadow.
6. The slightly different aspects of an object as seen by the two eyes.
7. The differential strain on the external muscles of the eyes as the eyes focus on objects at different distances.
8. The doubling of the background or foreground depending on whether the foreground or the background is fixated.

C. Space can be experienced through the skin senses.

1. Cutaneous stimulation tends to produce movements of adjustment developed through training from reflex responses.
2. There is no doubt that the relation of points on the body has to be learned.

D. Changes in speed of movement give awareness of space.

1. Movement of the fluid in the vestibule and semicircular canals in the inner ear is important in space perception.
 - a. This mechanism is important in the maintenance of posture and normal body balance.

E. The basis of three-dimensional space may be in the orientation tendencies, the movements which the body tends to make in adjusting to stimulation at various points.

1. Every spot in the retina may have a "local sign," a space attribute which is reported to consciousness along with the quality of the sensation.
2. Tendencies to movement may account for the integration of such cues:
 - a. Reflex tendencies of the eyes to move toward objects attracting attention.
 - b. Learned responses built up through tendencies to reach and feel for objects.
3. We learn spatial order in terms of what we do, or should have to do, to manipulate things, to use the world.

V. Experience is organized in time.

- A. Nothing seems capable of existing in consciousness without pulsating to some extent.
- B. Very short intervals are judged in terms of the actual amount of change observed.
 - 1. Time is considered longer if more happens in it.
 - 2. With longer intervals this does not seem to hold.
 - a. The more we have to do in a given time the faster the time seems to pass.
 - b. Empty time grows heavy on our hands.
- C. Body rhythms are important in the estimation of time.
 - 1. Heartbeat and respiration are of some, but not major, importance.
 - 2. Longer rhythms, such as those involved in gastric activity and glandular changes, may be important.
 - 3. There is a relationship between apparent length of time and body temperature.
 - a. The higher the temperature, the more rapidly time seems to pass.
- D. Habits, interests, and social conditions are important in time estimation.
- E. Experiments demonstrate that perception of time involves grouping and integration of experience.
- F. Space is used in judging time and time is used in judging space.
- G. An interesting aspect of time perception is the attitude toward the future.
 - 1. The future seems less "real" the more remote it is.
 - 2. For little children the remote future might be said not to exist.

VI. When perception involves misinterpretation, the result is an illusion.

- A. Most illusions are due to the way in which sensory impressions are grouped.
- B. Many optical illusions depend largely on eye movements, but not entirely so.
 - 1. Habits of observation are important.
 - 2. The illusions occur even though there is no eye movement.
- C. Some of the optical illusions can be matched with illusions in time estimation.
- D. Illusions are subject to the same psychological laws about the interpretation of sensations which apply to all acts of perception.

Name Section Date.....

Do these exercises after you have read Chapter X. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

1. Persons born blind and receiving sight when adult report
 - (a) a confused mass of pure sensations (b) well-organized visual fields (c) that all objects seem two-dimensional (d) first color-blindness, then blue-yellow vision, and finally red-green also (e) unitary but confused and meaningless visual experiences.
2. "Color constancy" and "brightness constancy" demonstrate
 - (a) the inability of the retina to distinguish color when brightness is constant, and vice versa (b) the dependence of dark adaptation on the retinal cones (c) the influence of the surroundings on our impression of a stimulus (d) the three-color theory (e) the resonance volley theory.
3. Injury to the fovea results in
 - (a) the establishing of a new point of relatively clear vision (b) loss of visual space orientation (c) aphasia (d) inability to see complete objects (e) echolalia.
4. Which three of the following provide clues to the visual perception of depth?
 - (a) lens adjustment (b) the Purkinje phenomenon (c) micropsia (d) entoptic light (e) contraction of the cornea (f) foreshortening (g) relative haziness (h) color contrast.
5. If we fixate a near object and then attend to the background
 - (a) we see the background as lacking in form (b) the background appears as it is seen by a color-blind person (c) the background appears double (d) the object fixated appears double (e) we set up anastomosis of the retina.
6. Monocular judgment of distance is made
 - (a) solely by means of sensations from the lens (b) by means of a number of cues (c) by virtue of associated past judgments made in binocular observation (d) through unconsciously guided eye movements (e) by means of a cortical distance-judging center.
7. Binocular judgment of depth makes use of a cue not used in monocular observation. This cue is
 - (a) superposition of objects (b) relative haziness (c) lens adjustment (d) foreshortening (e) differences in the retinal aspects.
8. Judgments of depth are markedly more accurate for
 - (a) monocular than binocular vision (b) binocular than monocular vision (c) the primary colors than other primaries (d) persons having microptic retinal areas than normal persons (e) far range than close range vision.
9. Our perception of the spatial location of a tactual stimulus is dependent on
 - (a) slight movements of adjustment connected with the point (b) the Poggendorf effect (c) Broca's area (d) the distance of the point from the central nervous system (e) the conduction rate of the neurone stimulated.
10. Perception of space through the skin senses is mediated by
 - (a) adjustive movements (b) specific local cues for different areas (c) local signs

depending on skin texture (d) a special space-perceiving sense (e) the semicircular canals.

—11. Changes in the speed of movement when a blindfolded subject is whirled about in a revolving chair are dependent on

(a) the semicircular canals (b) the cochlea (c) the Rolandic fissure (d) the Müller-Lyer effect (e) motor aphasia.

—12. Our judgments of time are dependent on

(a) innate ideas (b) free association (c) our judgments of space (d) binocular rivalry (e) local sign.

—13. The most probable explanation of illusions is in

(a) eye movements (b) inability to isolate the part which is to be judged (c) cerebral injuries (d) after-images (e) competitive instincts.

—14. It seems likely that perception develops in the child by

(a) instinct (b) association of raw sensory experiences (c) analysis of unitary experiences (d) drawing pictures of a cylinder (e) maturation.

—15. Young children are unable to draw cylinders because of

(a) difficulties in analyzing the cylinder for two-dimensional representation (b) inability to see objects as three-dimensional (c) poor development of form perception (d) an innate tendency to represent all objects by circles or rectangles (e) the tendency toward disintegration which children exhibit in reproducing forms.

—16. The rôle of language in perceptual analysis is

(a) negligible (b) unimportant (c) of some little importance (d) of great importance (e) not accessible to experimental study.

Chapter XI

Try to answer these questions before you read Chapter XI.

- What is happening in your nervous system when you are recognizing a friend?
With which part of your brain do you see?
What are different sections of your brain doing as you are sitting with friends and listening to a familiar opera?
Which of the five senses needs the most activity in the nervous system for stimulation?
What kind of structure do you expect to find working in the brain when you hear a sound that makes you remember a familiar scene?

CHAPTER XI—PERCEPTION AND THE NERVOUS SYSTEM

- I. The cells of the nervous system, adapted to swift conduction of excitation, have undergone further specialization:
 - A. The central nervous system:
 1. The brain:
 - a. The brain stem, the continuation of the spinal cord within the skull cavity.
 - b. Cerebral hemispheres:
 - (1) Frontal lobes, at the front
 - (2) Occipital lobes, at the back
 - (3) Parietal lobes, at the top
 - (4) Temporal lobes, at the sides.
 2. The spinal cord.
 - B. The peripheral nervous system:
 1. Incoming, sensory nerve fibers
 2. Outgoing, motor nerve fibers.
 3. If one examines a nerve trunk in the body, following the structure to the spinal cord, it will be noticed that the trunk does not join the cord in one place.
 - a. Those fibers which are the sensory fibers of the nerve trunk enter the cord through the posterior root.
 - (1) Incoming fibers find their way into vertical, ascending tracts.
 - (2) These fibers are grouped, joining other fibers serving the same sense in other regions of the body.
 - b. Those fibers which are the motor fibers of the nerve trunk have come out of the cord through the anterior root.

- c. No fiber is both sensory and motor, though the two kinds fibers are to be found within the one nerve trunk.

C. The autonomic nervous system:

- 1. Centers lie outside the spinal cord.
- 2. Fibers innervate structures usually not subject to voluntary control.
 - a. Vital organs
 - b. Walls of arteries and glands, etc.

II. There are brain centers for the different sensory functions.

- A. When sense organs are stimulated, they excite the sensory nerve fibers connected with them.

B. There are different pathways for fibers serving different functions:

- 1. The kinæsthetic sense:
 - a. Incoming fibers from the muscles terminate in the medulla, later in the brain stem.
 - b. A second relay brings the impulse to the forward end of the brain stem, the thalamus.
 - c. A third relay serves to bring the impulse to the brain centers.
 - (1) The center for the muscle sense is in the parietal lobe behind the fissure of Rolando.
 - (2) This region is called the sensory projection area.
- 2. The skin senses (warmth, cold, touch, pain):
 - a. Incoming fibers terminate in the gray matter of the spinal cord.
 - b. The second relay takes the impulse up to the thalamus.
 - c. A third relay takes the impulse to the sensory projection area, which is the center for the skin senses as well as for the muscle sense.
- 3. Hearing:
 - a. The fibers which leave the inner ear go but a short distance.
 - b. The second relay carries the impulse to little bodies near, and functionally part of, the thalamus.
 - c. The third relay goes to the auditory center in the temporal lobe.
- 4. Seeing:
 - a. Vision is somewhat more complicated than the other senses.
 - (1) There are more relays.
 - (2) Having two eyes focused on a single object requires a complex redistribution of the fibers from the two eyes.
 - (3) A connection is made in little bodies near the thalamus near the little bodies involved in audition.
 - (4) Fibers from this part of the thalamus form the final relay which sends the impulse to the visual center in the occipital lobe.

III. Simplified summary of the way the nervous system works:

- A. Fibers from the sensory areas make synaptic connections.
- B. They carry impulses to the motor area, in front of the fissure of Rolando.
- C. Pyramidal cells, whose fibers pass down the brain stem into the spinal cord, are stimulated.

- D. They make synaptic connections in the cord with fibers which lead to and excite the muscles.

IV. The operation of the nervous system is probably more complex than has been stated.

- A. As far as we know, consciousness depends upon the arrival of a sensory impulse at the brain center for that sense.

- B. Probably several brain centers operate with the pyramidal cells of the motor area in producing voluntary movements.

- 1. Complete destruction of the motor area causes only temporary paralysis in dogs and monkeys.

- 2. After recuperating from the operation, animals can learn complex acts.

- C. Among the lower mammals, and in general in the lower vertebrates, loss of special sense centers does not involve complete loss of the sense.

- D. The primary motor area is not identical for all animals of one species.

- 1. There is day-to-day variation in the area in a single animal.

- E. Probably movement is elicited by a complicated brain pattern rather than through the involvement of a single point.

- F. It does seem sound to state that there is definite localization of some sense function in specific areas of the brain.

- 1. This holds for seeing, hearing, general sense area, and smell.

- 2. It cannot be proved for taste, the center for which is unknown.

- 3. In the higher mammals, injury to the sense area results in loss of function.

- G. We cannot with confidence state that there is specific and definite localization of motor function within the brain; we are justified, however, in saying that in the complex pattern involved in voluntary activity, the brain acts as a whole.

V. Interconnections of the parts of the brain enable it to act in an integrated way.

- A. A large part of the brain consists of association fibers which are not the locus of any particular sense but which connect different parts of the brain.

- B. Perception involves the connection of various parts of the brain.

- 1. The whole brain is active in the process of perceiving.

- a. The more complex is the perceptual process, the more complex is the brain activity.

- b. Association areas relate the various parts of the brain with one another and with the lower centers.

- 2. The brain does more than just register sense impressions, it organizes them.

- C. All the facts of perception and learning fall under a general law.

- 1. They are all cases of association.

- 2. Association is a question of brain connections.

- a. This statement needs to be worked out more fully.

- b. Large patterns of association may function at once, and each associative connection may be influenced by all the rest.

- D. Disorders of perception caused by brain involvement show the importance of connections made by association fibers.
1. Aphasia: a disorder in the understanding or in the use of words results from brain injury.
 - a. Sensory aphasia, the perception of wholes, is lost, though parts of an object may be observed:
 - (1) Involvement in visual mode
 - (2) Involvement in auditory mode.
 - b. Motor aphasia is the loss of the ability to say words appropriate to one's meaning.
 - c. All of the more dramatic phenomena of aphasia have close parallels in everyday experience.
 2. Agraphia: the separate movements involved in writing are still possible, but the necessary integration is lacking.
 3. Most brain injuries and brain diseases cause irregular and scattered destruction.
- E. Motor patterns are ultimately dependent upon the same kind of cerebral activity as perceptual patterns.

Name Section Date.....

Do these exercises after you read Chapter XI. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

1. Sensory fibers enter the spinal cord by
 (a) the thalamus (b) posterior roots (c) vertical ascending tracts (d) both anterior and posterior roots (e) the brain stem.
2. The brain stem anatomically and physiologically resembles
 (a) the cerebrum (b) the cerebellum (c) the corpora quadrigemina (d) the spinal cord (e) the nerve-net.
3. Most descending nerve fibers from the cerebrum can be found in
 (a) the pyramidal tract (b) the temporal lobe (c) the posterior spinal roots (d) the nucleus (e) the fissure of Rolando.
4. Consciousness of a sensory stimulation seems to depend on the arrival of the nerve impulse at
 (a) the medulla (b) the thalamus (c) the sensory projection areas (d) the spinal cord (e) the pyramidal tracts.
5. There has been fairly satisfactory demonstration of the precise brain localization of
 (a) conceptual functions (b) sensory functions (c) imaginal functions of rat but not of man (d) motor functions (e) intelligence.
6. Destruction of the motor areas of the cortex of monkeys results in
 (a) temporary paralysis (b) permanent paralysis (c) no paralysis (d) temporary loss of sensation (e) death.
7. Complete removal of the visual area of monkeys, apes, and men causes
 (a) temporary blindness (b) partial blindness (c) permanent total blindness (d) near-blindness (e) spots before the eyes.
8. Extirpation of the visual sensory areas of both hemispheres causes
 (a) total blindness in both higher and lower vertebrates (b) total blindness in higher but not in lower vertebrates (c) total blindness in lower but not in higher vertebrates (d) micropsia (e) hemianopsia.
9. The cortical area at the rear of the brain is the center for
 (a) taste and smell (b) hearing (c) touch and kinæsthesia (d) motor control (e) vision.
10. The cortical auditory center is located in the
 (a) frontal lobes (b) temporal lobes (c) parietal lobes (d) occipital lobes (e) red nucleus.
11. The major function of the association areas in perception is probably
 (a) to maintain the head erect (b) to register sensory impressions (c) to organize sensory impressions (d) to prevent aphasia (e) to connect different parts of the muscular system.
12. Impulses are transferred in the cerebrum from the sensory projection fibers to the descending pyramidal fibers by means of

(a) association fibers (b) the cerebellum (c) the frontal lobe (d) the volition center (e) the corpora quadrigemina.

—13. The loss of ability to say words appropriate to one's meaning is called (a) abulia (b) anorexia (c) aphasia (d) ataxia (e) alluria.

—14. The loss of ability to write words appropriate to one's meaning is called (a) agraphia (b) photographia (c) pornographia (d) caligraphia (e) azygraphia.

Chapter XII

Try to answer these questions before you read Chapter XII.

- How many things can we attend to at one time?
- Why can you see and repeat 25 letters at one time if they are combined into words, but only 4 or 5 if they are shown as units?
- Explain the "absent-minded professor."
- Why does the ticking of the clock seem very loud when you cannot sleep?
- What is an easy way to make a child stop crying?

CHAPTER XII—ATTENTION AND DISCRIMINATION

- I. Attention is the process by which we select from and emphasize specific parts of the general field of stimulation.
 - A. Everything perceived is selected from a realm of things which might be perceived.
 - B. Not everything present to the senses is attended to.
 - C. Some items are responded to more definitely than are others in the surroundings.
 - 1. Sense organs are selective.
 - a. Many of the sense organs of animals are movable:
 - (1) Sniffing
 - (2) Shifting the ears
 - (3) Moving the eyeballs.
 - 2. Selection is carried out by the organism as a whole.
 - 3. Perhaps the thing attended to is that which arouses the most concentrated brain activity.
 - D. Perception involves grouping and integrating elements which sense organs report.
 - E. There is relatively clear awareness of some things and relatively obscure awareness of other things.
 - 1. The focus of consciousness includes only those elements to which we are directly responding.
 - 2. A secondary "zone," the fringe of consciousness, is made up of things which are acting upon us but to which we are not attending.
 - 3. A third type, material beneath the threshold of consciousness, includes the things acting on the sense organs but not forcing their way into consciousness at all.
 - 4. From the introspective point of view, the difference between focus and fringes of consciousness is a difference in "clearness."

5. Slight changes may cause stimuli of the second and third type to come into the focus of consciousness.
 6. We can look at one thing while attending to another.
- II. The focus of consciousness is always an organized whole.
- A. Experiments with the span of apprehension corroborate the belief that the focus is organized.
 1. Study of the span of apprehension is the study of the number of objects which can enter the focus so as to be grasped at once.
 - a. Study has been facilitated by the development of the tachistoscope, an apparatus for the very brief presentation of stimuli.
 - b. Most of the work has been done in the fields of sight and hearing.
 2. With minimal exposure, four or five letters or digits can be reported by adults.
 3. If the letters are combined into words, twenty or twenty-five letters can be taken in, for the adult can report four or five words.
 4. The normal growth of the span of apprehension is related to mental development.
 - B. It is misleading to call these experiments "studies of attention span."
 1. The "span of attention" implies discrete simultaneous aspects of consciousness.
 2. There may be several aspects of that to which one is attending, but at any time that the stimuli are being attended to, they are integrated and related so that there are no distinct parts within the field of attention.
 - C. Normally we cannot really attend to two things at once.
 1. There may be rapid fluctuations from one conscious activity to another.
 2. Some abnormal cases report true splitting of consciousness.
 3. These cases represent abnormalities; the normal is integration, activity of the organism as a whole.
 - D. Automatic activities may go on parallel to conscious activities.
- III. Attending is a kind of activity; the organism as a whole does the attending.
- A. There is not a general power of attention within an individual.
 - B. There are complex abilities dependent upon properties of the sense organs and other parts of the body including the brain.
 - C. Apparent fluctuations occur in objects whose actual energy value with reference to one's body remains the same.
 1. There is variability in the selective function.
 2. The body is variable and undependable as a receiving station.
 - a. These fluctuations seem due to changes in body conditions.
 - b. They are not simply shifts in attention but variations in the threshold of the stimulus.
 - D. True fluctuations of attention are involved in the shifting of perceptual patterns.

1. Some of the alternation may be due to eye adjustments and body variation.
 2. It seems unlikely that the fluctuation can be entirely explained by these movements.
- V. Perception of differences between stimuli depends upon relative intensities.
- A. Experiments led to Weber's law: In comparing any two stimuli of like quality, the quantitative difference required for correct comparison is a constant fraction of the smaller stimulus.
1. The fraction varies for the different senses.
 2. Weber's law holds, in general, for the middle range of intensities of most sense modes.
 3. At low and high intensities the figures do not accord with the theory.
 4. Bodily response may be considered as increasing arithmetically as stimulus intensity increases geometrically (arithmetical progression: a sequence where each number is the preceding plus a constant amount; geometrical progression: a sequence where each number is the preceding, times a constant amount).
- B. Improved experimental methods have been developed for the study of discrimination.
1. The field of such study is called psychophysics.
 - a. Such studies assume that the difference between two stimuli necessary to permit discrimination in an experiment is constant.
 - b. There is much variability in responses involving discrimination.
 - c. Standards of success are set to serve as the basis of comparison and to take into account the variability of responses.
 2. The methods developed are called psychophysical methods:
 - a. Method of just noticeable differences.
 - b. Method of minimal changes.
 - c. Method of constant stimuli.
 - d. Method of average error.
 3. There are other studies of discrimination not ordinarily classed as psychophysics.
 4. The method of measurement by relative position is useful in studying stimuli which cannot be directly measured.
 - a. It was originally used in studying sensory discrimination.
 - b. Average score made by many judges is in almost perfect agreement with true order.
 - c. It has been resorted to for studying and rating phenomena:
 - (1) Excellence in handwriting
 - (2) Quality of English composition
 - (3) Degree of eminence of scientific men
 - (4) Quality of work in mechanical drawing.
 - d. Dependable ratings are made possible when used by skilled people.
- V. Habits of attending develop gradually.
- A. Selection among stimuli is at first involuntary.

B. Various factors give certain stimuli an advantage over others:

1. Intensity
2. Change
3. Duration
4. Sharpness of outline.

C. We attend to things we have learned to attend to.

1. Selection among stimuli is dependent on experience.
2. Development of habits of attention involves building up habits response to stimuli which were previously not dominant.
3. There are limits to such selection and control.
 - a. Some stimuli are so intense we cannot shut them out.
 - b. The limits are not such that they prevent the existing of great individual differences in habits (not powers) of attention.

ne Section Date.....

Do these exercises after you have read Chapter XII. Select the most satisfactory of alternatives presented and place its letter on the line provided at the left.

. The normal attentive consciousness is
 (a) unable to attend to more than one thing at a time (b) unable to carry on more
 than one complex activity at a time (c) composed of a single level of attentivity (d)
 is disorganized (e) only gradually able to change its content.

. An object whose actual energy value relative to one's body remains the same
 produces a constant effect upon the body (b) produces a constant effect upon
 consciousness (c) appears to fluctuate in its intensity (d) steadily increases in its
 present intensity (e) appears to decrease steadily in intensity.

. If a line of 49 centimeters can be differentiated from a line of 50 centimeters,
 what length of line will be differentiated equally often from a line of 25 inches?
 (a) 24.8 inches (b) 22.5 inches (c) 24.0 inches (d) 24.5 inches (e) 24.9 inches.

. Discrimination involves
 (a) comparison of one subject with the memory of another (b) arousing memory
 images of two objects (c) perception of relations (d) sensory acuity of the highest
 order (e) specific training.

. Psychophysical studies assume that
 (a) an individual's relative error in comparing stimuli is reasonably constant (b) all
 individuals have equal ability to discriminate between stimuli (c) the attitude of the
 individual is unimportant in discrimination (d) a judgment of "more" or "less" can
 always be made (e) different methods give entirely different results.

. The psychophysical method useful in measuring things not measurable by a
 physical instrument is
 (a) the method of relative position (b) the method of average error (c) the method of
 constant stimuli (d) the method of minimal changes (e) the method of just
 noticeable differences.

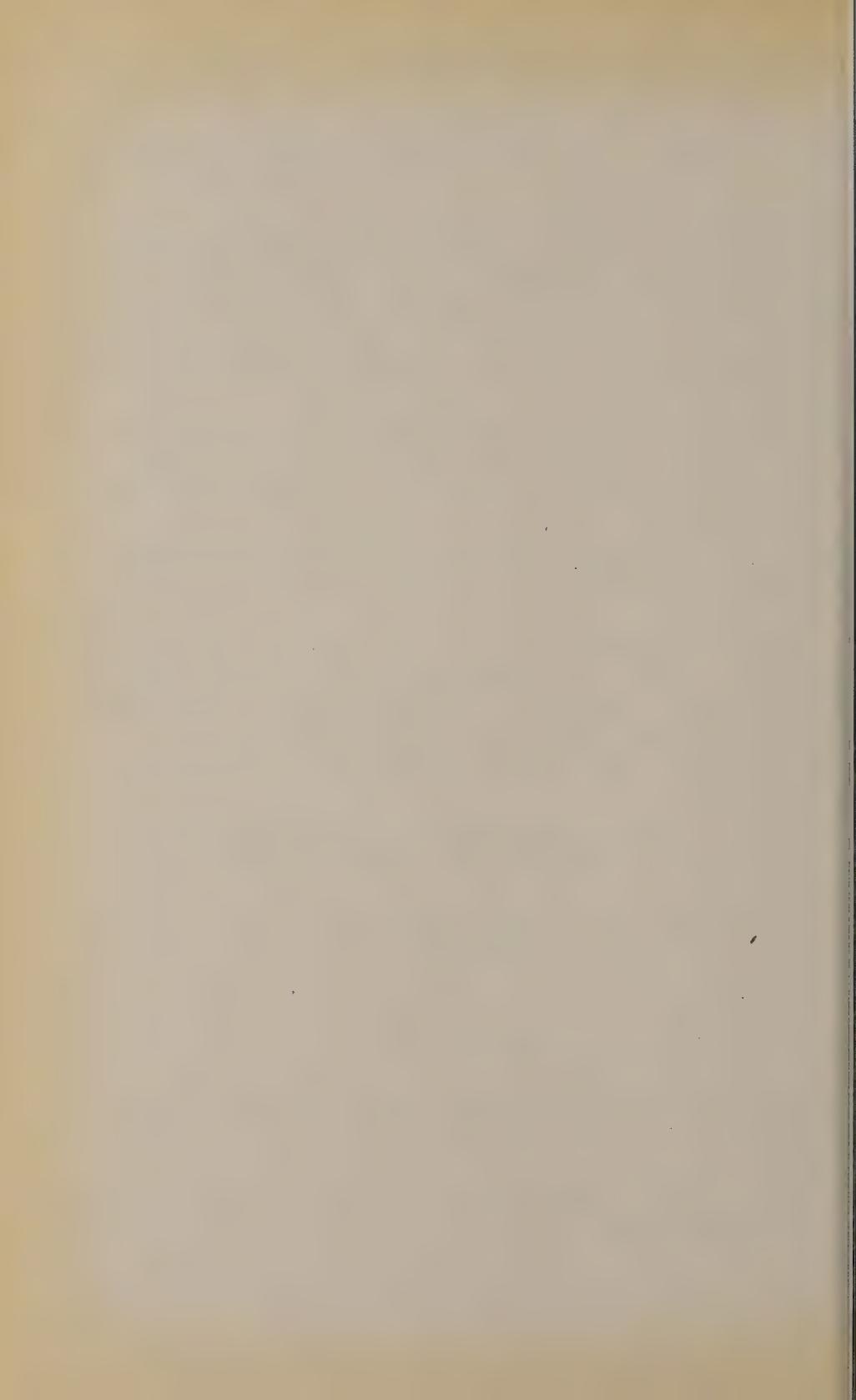
. The psychophysical method in which the subject tries to make an adjustable
 stimulus equal to a fixed stimulus is called the method of
 limits (b) recognition (c) paired associates (d) average error (e) multiple choice.

. Weber's law relates to
 (a) sensory discrimination (b) forgetting (c) aesthetics (d) the span of attention
 (e) the logarithmic nature of the learning curve.

. An instrument used in measuring the visual span of apprehension is the
 chronoscope (b) tachistoscope (c) psychograph (d) pupillometer (e) campimeter.

. Russian experimenters have used the conditioned response as a test of dis-
 crimination in animals in

(a) aesthetic judgments (b) auditory acuity (c) moral knowledge (d) use of lan-
 guage (e) somæsthetic illusions.



Chapter XIII

Try to answer these questions before you read Chapter XIII.

Why do you learn the subject matter of one course more easily than that of another?

What is the best way to train a dog to do tricks?

How do children learn to talk?

What is the difference between the swimming of a beginner and the swimming of an expert?

How does modern advertising use "suggestion"?

It is said that we learn to swim in the winter and to ice skate in the summer. Explain.

CHAPTER XIII—MOTOR LEARNING

- I. Learning is the modification of response through interaction with the environment.
 - A. There must be a preliminary need or drive or restlessness.
 - B. Activity is at first uncoordinated, random.
 - C. In time, some responses tend to be eliminated; others, to be repeated.
 - D. Finally, useless responses are dropped out and those which satisfy the original need are fixated.
 - E. Learning can be represented graphically by a learning curve.
 1. All forms of motor learning, learning in which changes of responses of the striped muscles are involved, tend to conform to a single type of curve.
 2. The typical curve is negatively accelerated, marked progress at the beginning with less and less improvement as practice continues, demonstrating "diminishing returns."
 3. Maximum efficiency under given conditions is called "physiological limit," even though it is recognized that this is arbitrary and not really the physiological limit.
- II. Learning may be studied by experimental analysis.
 - A. Organisms of different degrees of complexity may be used.
 1. Adult human beings are very complicated subjects.
 2. Children may be used in experiments.
 3. Animals may be used in experiments, e.g., the white rat.
 - B. The task used for experimenting must conform to several requirements:
 1. It must be novel.
 2. It must be governed by incentives.

3. It must be subject to objective analysis.
4. It must involve measurable results.
- C. Two widely used types of tasks have been developed:
 1. The maze:
 - a. Running time may be measured.
 - b. Number of errors made per trial may be recorded.
 - c. Total number of errors made while learning may be computed.
 - d. The specific errors made may be studied.
 - e. The nature of the changes in time-and-error measurements may be studied.
 2. The problem box.

III. From the experimental studies of learning some facts have been revealed.

- A. From the study of maze learning, several facts have been revealed.
 1. Learning depends on strength of drives.
 - a. Rats with no special needs will not run the maze.
 - b. Two different drives, each very strong, give approximately the same learning curves.
 - c. Rats stunted due to malnutrition do better than normal rats normally hungry.
 2. The promptness with which responses are fixated depends on the directness with which they satisfy the drives.
 - a. Errors resulting in more severe punishment are eliminated before those resulting in less severe punishment.
 - b. Shortest pathways to the goal are fixated.
 - c. Pathways nearest the goal are learned first.
 3. The animal is not passive, but is building up positive and negative responses.
 4. Maze learning depends on a variety of cues, among which the muscle sense is very important, though others may be depended on.
- B. From the study of the learning of telegraphy and typing several facts have been revealed.
 1. In human adult learning of a complicated task, principles derived from animal maze learning apply.
 2. "Higher units" are organized; groups of elements are responded to as if they were one element.
 3. "Plateaus," periods of apparent lack of progress during the learning process, may be followed by a spurt in the learning.
 4. Plateaus may be related to the development of higher units, e.g., in telegraphy there may be transition from letter habits to word habits to phrase habits, etc.
- C. These generalizations serve to establish principles but they do not tell what learning is.

IV. The conditioned reflex is the simplest form of motor learning.

- A. The process by which a dog who is given meat powder and hears a tuning fork, in time builds up the response which causes him to salivate when

the tuning fork is sounded but no meat powder is given him, is called conditioning.

1. A conditioned reflex is a reflex elicited by a stimulus which is ordinarily biologically inadequate to arouse the response, but which, having been presented along with a biologically adequate stimulus, has come to be an effective substitute for the biologically adequate stimulus.
- B. Reflex arcs are specific reaction systems providing innate responses to a variety of stimuli.
- C. Reflexes differ in many respects:
1. Sharpness of localization
 2. Time required to arouse them (latent time)
 3. Time they remain in action after stimulus is removed (after-discharge).
- D. Reflexes have several common characteristics.
1. Each is touched off by a special kind of stimulus.
 2. Most reflexes can be made stronger by using two or more stimuli; called summation.
 3. Each reflex has a threshold, a magnitude above which stimuli have to be in order to produce any response at all.
 4. Two stimuli, each below the threshold, if applied together may summate to produce a response.
 5. Two stimuli, instead of summing, may interfere with each other and produce no response; called inhibition.
- E. Dominance of some reflex systems, differential effectiveness of neural patterns, serves as a clue to conditioning.
1. Each stimulus has a response "appropriate" to it, e.g., reaching to a light, withdrawing at a loud noise.
 2. Two response systems need not have the same potency; one may be stronger than the other.
 3. With sufficient repetitions of the two experiences, the dominant response, originally appropriate to only one of the stimuli, can be elicited by either; e.g., the child can be made to withdraw by presenting a light, whereas the original response was to reach toward it.
 4. Responses can be changed by presenting the undesired response system in connection with a desired response set-up so that the latter will be dominant.
 5. Conditioned responses often die out if the original stimulus is discontinued and the originally inadequate stimulus is presented repeatedly.
- F. "Suggestion" is the blind following of verbal commands based largely on conditioned responses to familiar words.
1. The child is "trained" to carry out verbal commands of adults.
 2. The suggestion is constantly repeated, as in advertising.
 3. Interfering suggestions are avoided.

- G. Imitation, defined as doing something because one observes another doing it, is explicable in terms of the conditioned response.
 - 1. Sight of a movement occurs simultaneously with performance of movement and in time becomes a stimulus for the movement.
 - 2. This develops the so-called "circular reflex": doing something—seeing—doing—seeing, over and over again.
 - 3. We can only imitate something we have already done, or the component parts of which we have in our repertory of behavior.
- H. The delayed response is a special form of conditioning.
 - 1. Different species vary in their excellence at making a response after a lapse of time.
 - 2. Some of the lower mammals depend entirely on the direction in which their head is turned for their later response.
 - a. If their heads remain pointing to the correct spot, they make the correct response.
 - b. If the experimenter turns their heads, they make an incorrect response.
 - 3. Higher mammals do not depend directly on this sort of gross body orientation.
- I. Learning of both simple and complex responses involving a series of movements may be explained by the conditioned response.
 - 1. Many complex patterns involving a series of movements, e.g., running a maze, are *not* learned in fragments, but the task as a whole is learned by the animal as a whole.
- J. The conditioned response is a useful cue to complex learning but leaves out the problem of how patterns of responses are reorganized.
- V. An important kind of learning involves complete reorganization of behavior, not piecemeal but all at once.
 - A. The normal perceptual field undergoes frequent reorganization, repatterning, even though there are no changes in the objects in the field.
 - B. When these shifts occur in a learning situation they result in new complexes of behavior.
 - 1. The new behavior, when it results in the achievement of the goal, is described as "insight."
 - 2. The new behavior may aid or hinder the achievement of the goal in the situation.
 - 3. The behavior itself may be the result of previous conditioning, but the conditioning cannot explain the dynamics of the perceptual shift.
 - 4. The dynamics of the shifts seem related to variations of the thresholds of the body.
 - 5. The concept of "trial and error" in learning need not be abandoned.
 - C. Useful shifts in novel situations suggest comparison with "creative thinking."
 - D. Radically new insights are merely applications of newly organized habits built up in the past but arranged into a new and appropriate system.

VI. A child's learning to talk serves as an illustration of all of the main principles of motor learning.

A. Active language, what the child says:

1. Original restlessness and needs
2. Random responses (including babbling) some of which are rewarded
3. Rewarded responses are fixated, others drop out.

B. Passive language, understanding of what the child hears:

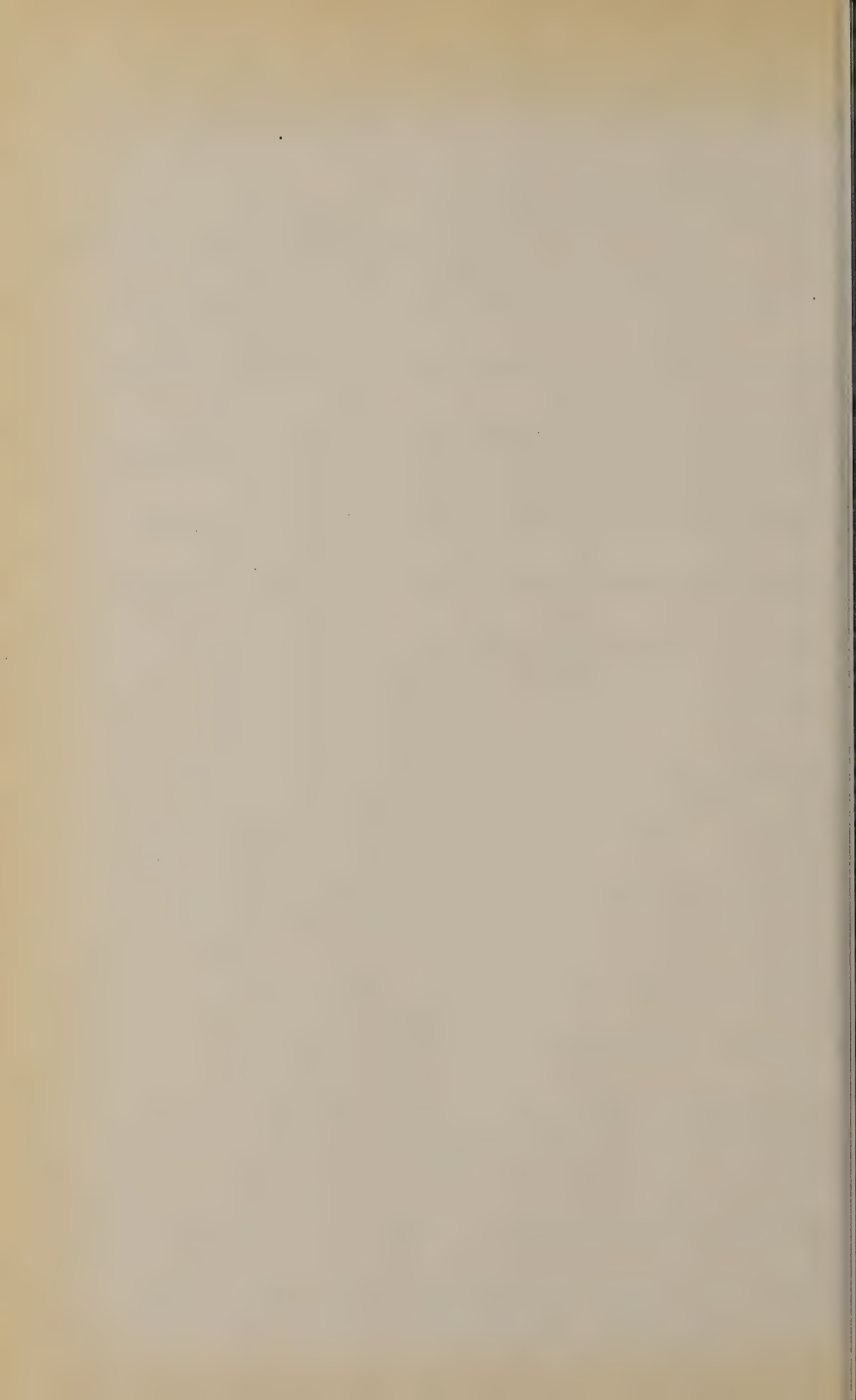
1. Words are used by adults simultaneously with presented objects or acts.
2. Principles of conditioning apply to the child's expectancy of behavior on hearing words.
3. Perceptual shifts develop interweaving associations.

C. Active language is only partly based on passive language; the two grow together and in time become associated.

D. Circular reflexes are common in young children.

E. Higher units, both perceptual and motor, are developed; language becomes a unit.

F. Verbal material is reorganized into new forms, insight is demonstrated.



Name Section Date

Answer these questions after you have read Chapter XIII. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

—1. Three measures commonly used in studying maze performance are
 (a) latent time (b) time per trial (c) errors per trial (d) plateaus (e) retained members (f) action currents (g) trials to learn.

—2. Trial-and-error behavior
 (a) is all behavior in which the organism is "trying" to do something (b) is unmotivated or causeless behavior (c) does not occur in man (d) refers to the constant shifting of the organism from one response to another (e) rarely results in learning.

—3. Conditioned reflex and trial-and-error learning have in common
 (a) traumatic experience (b) visual activity (c) motivation (d) seeing a relation (e) kinesthetic imagery.

—4. When a conditioned response is established on the basis of another prior conditioned response
 (a) the first response suffers experimental extinction (b) the situation is known as psychic trauma (c) the original unconditioned stimulus must be present also (d) we have "rational" behavior (e) we have a second-order conditioning.

—5. The decrease in the rate of learning in the latter stages of the learning curve is probably due to
 (a) fatigue (b) overlapping (c) dominance of stronger activities over weaker ones (d) individual differences (e) elimination of errors in inverse order of difficulty.

—6. Dominance refers to the fact that
 (a) an organism's response obeys the principle of the resultant of forces (b) one group of responses will usually tend to find expression while holding all others in check (c) the mother rat tends to eat her litter (d) motor activity is more easily aroused than imagery (e) the effect of hypnosis is to make the personality of the hypnotist dominate that of the subject.

—7. The experienced driver's automatic habit of stepping on the clutch pedal when shifting gear is an example of
 (a) kinesthetic dominance (b) dissociation (c) trial-and-error behavior (d) the Adrian principle (e) peripheral motivation.

—8. If a conditioned response is frequently aroused without using the original stimulus, the response is ordinarily
 (a) greatly increased (b) more rapid (c) of longer duration (d) subject to rapid extinction (e) more widespread.

—9. In discussing the problem-solving behavior of chimpanzees Köhler stresses
 (a) trial-and-error behavior (b) retinal rivalry (c) circular responses (d) perceptual organization (e) memory span.

—10. The two types of language habits acquired by a small child are
 (a) verbal and motor (b) visual and auditory (c) conditioned and innate (d) active and passive (e) rote and meaningful.



Chapter XIV

Try to answer these questions before you read Chapter XIV.

What do you see after you have looked at a red light steadily for a time, and then look away?

What is a hallucination?

It is said that free associations are not free at all. What does this statement mean?

Explain the meaning of the term "mental set."

Why are associations formed so that thinking of one thing calls up another?

What is the best way to figure out where you put that mislaid key?

How long after you have ceased looking at an object do you continue to see it?

CHAPTER XIV—IMAGERY AND ASSOCIATION

- I. Residues of sense impressions are called "after-images" and "memory images."
 - A. Latent time, the time required to arouse tissue to activity, is involved.
 1. It takes about .005 to .1 second to arouse a sense organ.
 2. Time is taken transmitting the neural impulse to the brain.
 3. The brain connections require some time.
 4. The outgoing fibers and the muscle involvements require time.
 - B. After stimulation has been stopped, there is a brief period during which the normal cell—sensory, neural, or muscle—continues to function.
 1. The duration of the after-discharge is a function of the intensity of the original stimulus.
 2. The after-discharge can be varied by variations in the stimulus.
 3. The fading out of the after-discharge is gradual.
- II. Vision yields many imagery phenomena.
 - A. After the original sensation, there is a positive after-image like the original sensation.
 - B. After the first after-image, there is frequently a negative after-image.
 1. The negative after-image has the same size and shape as the original object.
 2. The negative after-image has a different color, usually the complementary of the color of the original object.
 - C. After the negative after-image fades there still remains a picture or image of the object, the memory image.
 1. The memory image is at first vivid.
 2. In time, the memory image becomes no more vivid than an ordinary mental image.
 - D. This series of optical phenomena depends on both retina and brain; the first stages depend more upon the retina than the later stages.

- E. Most ordinary visual imagery involved in memory seems to depend on brain activities resembling those which occurred when the object was originally seen.
 - F. Subjects have difficulty, under some conditions, in distinguishing between seeing and imagining.
 - G. Visual *experience* is about the same in seeing and hallucinations.
 - 1. Images may seem exactly like sensations.
 - 2. The term "illusion" applies when there is a misinterpretation of a sensory stimulus.
 - 3. A hallucination is an experience based on imagery, with no known excitement of sense organs.
- III. The sense of hearing yields some of the imagery phenomena.
- A. There is no true auditory after-image.
 - B. There is what corresponds to the first memory image.
 - C. Later, auditory memory images may apparently spontaneously appear.
 - 1. They may recur because of relation to muscular acts.
 - 2. They may recur without any definite muscular accompaniment.
 - 3. They may be very vivid.
- IV. Some adults and many children have realistic, "eidetic" images—images of objects previously seen which persist for long times.
- A. For some these eidetic images are plastic, rich, interwoven with the emotional life of the individual, and sometimes subject to voluntary control.
 - B. For others the eidetic images are unchangeable and unrelated to personal wishes or interests; intrusive.
 - C. These images are differentiated from hallucinations in that the subjects know the objects seen are not really there.
 - D. The individual differences in the nature of the images are related to glandular make-up.
 - E. Eidetic imagery seems richer in childhood than later on.
 - F. Formal education seems to destroy this kind of experience.
- V. Synæsthesia is the common tendency to tie images to sensations in other fields of experience.
- VI. An early study of imagery by a questionnaire yielded interesting results.
- A. There are large differences in the imagery of different individuals.
 - B. Most people had some imagery in several sensory fields.
 - C. Few people lacked imagery altogether.
 - D. In most people, visual imagery seemed best developed, auditory imagery second.
 - E. Abstract thinking seems to weaken imagery.
- VII. Subjective estimates of the vividness of images were found to be unreliable, and objective devices were developed:
- A. The letter square
 - B. Outlining of visual images on a screen.
- VIII. Laws describing the basis of the formation of associations have been described.
- A. Traditionally, these laws are four in number:
 - 1. Contiguity in time

2. Contiguity in space
 3. Similarity
 4. Contrast.
- B. Actually, these may be reduced to one law involving contiguity in experience.
- C. "Secondary" laws relating to the relative potency of factors have been stated.
1. The factors involved have been three in number:
 - a. Recency
 - b. Frequency
 - c. Vividness.
 2. Relative potency is a function of the fashion of utilizing these factors.
- D. Most associations are really controlled by habits and interests.
1. Principles of dominance apply to motives and interests, determining which shall influence the course of associations.
 2. Nearness to goal influences performance directly, frequently interfering with control of skilled acts involved in achieving it.
 3. Boredom and fatigue may so influence associations as to make shift to a novel task imperative.
 4. Internal steering may involve muscular tensions.
 5. Mental set, or control, exercises an overwhelming influence on the ordinary processes of association.
- X. The association test has been used to throw light on the nature of association.
- A. The free association test, in which the subject responds with the first word that comes to him.
1. Associations may be classified in terms of their relation to the stimulus word.
 2. Tables showing the relative frequencies of different responses have been prepared.
 3. The tests have been found useful in exploring mental abnormalities and conflict.
 4. The associations are not free to all.
 - a. They are guided by the form of the stimulus word.
 - b. The subject ordinarily gives himself the task of getting one response for each stimulus and of saying something which does not sound too absurd and which the experimenter will accept.
 5. Really free association tends to be chaotic and dream-like.
 - a. Previously active patterns determine the lines of the association.
 - b. Shifting blood supply in brain affects degree of brain activity.
- B. The controlled association test, in which responses must bear the given relationship to the stimuli.
1. In the performance of a serial task there may be an overlapping of processes; one word may be said while the next word is being read.
 2. Overlapping leads to greater speed of performance.
 3. Kinds of control vary greatly in speed shown.

4. Speed of association seems to depend on the factors:
 - a. Frequency of repetition.
 - b. Element of choice which enters into task.
- X. Autistic thinking is thinking which is its own reward.
 - A. The thinking is directly steered by one's needs or wants.
 - B. Both autistic and realistic thinking are dependent upon motivation.
 - C. The difference between autistic and realistic thinking is in terms of the immediacy and complexity of the control.

Name Section Date.....

Do these exercises after you have read Chapter XIV. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

- 1. After a sensation has faded away, there is the after-image called
(a) a positive after-image (b) a negative after-image (c) an intermediate after-image (d) a memory image (e) an eidetic image.
- 2. The optical phenomena following a visual sensation are dependent on
(a) the retina (b) the retina and the brain (c) the occipital lobe (d) the frontal lobes (e) the aqueous humor.
- 3. Galton, in studying imagery, found that
(a) many individuals trained in abstract thought were weak in imagery (b) most artists tended to rely on balance and rhythm rather than on visual imagery (c) imagery was absent if very short exposures were used (d) the thing *of which* one thinks must be added as a fourth mental element (e) receipts were compound images.
- 4. Which of the following is a test of imagination?
(a) the two-point threshold (b) hypnosis (c) the imaged cube test (d) the Warden-Warner maze (e) the circular response method.
- 5. Memory images which continue to be seen with hallucinatory vividness some time after the original experience are examples of
(a) synæsthesia (b) eidetic imagery (c) somæsthesia (d) Gestalt completion (e) visual dominance.
- 6. An experience of misinterpreting a sensory stimulus is
(a) a hallucination (b) an illusion (c) a delusion (d) a collusion (e) an example of retinal lag.
- 7. When a subject imagines himself lifting a weight with his right arm
(a) the muscles of the right arm contract (b) his imagery is usually kinæsthetic (c) his imagery is usually cerebellar (d) no imagery can be detected (e) no muscular activity can be detected.
- 8. "Contiguity" and "similarity" are the two principal conditions for
(a) mass response (b) dissociation (c) association (d) insight (e) invention.
- 9. Which of the following refers to a "secondary" law of association?
(a) temporal contiguity (b) spatial contiguity (c) experiential contiguity (d) recency (e) contrast.
- 10. An illustration of synæsthesia is
(a) the tendency to prefer complementary colors (b) poetic reference to "shrill colors" (c) the tendency to divide horizontal lines into two equal parts (d) the Müller-Lyer illusion (e) the Poggendorf illusion.

Chapter XV

Try to answer these questions before you read Chapter XV.

What is the best way of memorizing a long poem?

Explain the difference between the way you would go about memorizing a foreign language vocabulary and the method you would use to memorize a long prose selection.

How would you space your studying and review of this lesson so as to work at maximum efficiency?

Describe four methods that might be used in a laboratory study of the processes of memory.

What factors may make courtroom testimony even of honest witnesses inaccurate?

If you had a poor memory for names, explain how you would go about improving it. Why do we forget?

CHAPTER XV—MEMORY

I. Memory is a general term involving four processes: learning, retaining, recalling and recognizing.

A. There may be an abnormality of any one of these processes without any impairment of the other three.

1. The inability to learn is often found in senile dementia.
2. Retention may be affected in cases of brain injury, as from gunshot wounds.
3. Failure to recall personal experiences commonly occurs as an after-effect of emotional shock.
4. Recognition is frequently impaired:
 - a. In certain forms of insanity
 - b. In everyday life
 - c. In the experience of false feelings of familiarity, paramnesia.

B. Training in one function may affect other functions or performance of the same function by a different part of the body.

1. In such transfer of training, there is no general increase in the power of the faculty involved in the process.
2. Improvement is due to a carrying over of specific habits or techniques.
 - a. The use of words may be of value in new situations.
 - b. What is transferred may be a way of behaving, not one fixed act.
3. Degree of transfer is dependent on many things:
 - a. General intelligence of the subject
 - b. Number of words applicable to situation
 - c. Special interests and habits of observing.

- II. Several laboratory methods have been developed for the study of the processes of memory.
 - A. The memory span is studied by means of the longest series of elements that can be repeated after a single presentation.
 - B. Paired associates—connections are formed between pairs of items.
 - C. Retained members—material is presented in a sequence, subject is required to repeat as many of the items as he can.
 - D. Prompting—subject is "prompted" when he falters and the experiment continues until material can be gone through without prompts.
 - E. Saving—after lapse of time subject relearns material. Repetitions required for relearning as compared with original learning give index of saving.
 - F. Recognition—material originally presented to the subject for learning is mixed with extraneous material and the subject must identify the original material.
- III. Experiments have demonstrated the relative merits of several forms of memorizing.
 - A. Things must be attended to together if an important connection is to be formed.
 - B. In learning or in review, active recalling of the material is more efficient than passive rereading of the material.
 - C. Repetition at intervals is more effective than continuous rehearsal.
 - D. A complex pattern to be mastered as a whole is best learned as a unit by going through the whole thing rather than learning separate parts.
 - E. For very long material, it may be best to combine the whole and the part methods of studying.
 - F. Grasping of meaning is helpful in fitting details together in learning.
 - G. Meanings relate material to life purposes and attitudes and interests, aiding in the retention of the material, providing vividness to associations.
 - H. The use to which material is to be put will affect the memory processes involved.
- IV. Laboratory studies have used both meaningful and meaningless material.
 - A. Elementary laws of association hold for nonsense material.
 - B. In nonsense material there seems to be both backward and remote forward association.
 - C. In meaningful material there is no backward association.
 - D. In meaningful material remote forward association is present in a "negative amount."
- V. The curve of forgetting with the passing of time has been studied.
 - A. The curve may be plotted through the use of any of the methods for studying memory.
 - B. Meaningful material is forgotten more slowly than nonsense.
 - C. Material which has been thoroughly learned sticks better than that just barely learned.
 - D. About a year after an ordinary college course is completed, more than half of the material has been forgotten.

- E. Things are not forgotten through the mere passage of time, but because of the interference of other things.
- F. Though the ordinarily plotted curve of forgetting is a smooth curve, we may sometimes forget material in large lumps.
- G. The effect of training may be to interfere with the performance of another function.
 - 1. Interference is greatest when a half-learned task is followed by a new one more or less like it.
 - 2. If a learning period is followed directly by a new task, the new task detracts from the value of the learning; retroactive inhibition.
 - 3. Retroactive inhibition depends largely on the degree of similarity between the two tasks.

VI. Experiments demonstrate that testimony is incomplete and inaccurate.

- A. Practically nothing that is not directly observed is remembered.
- B. In general, one does not remember by calling up a picture of the scene, but by reviewing specific items originally observed.
- C. Trained observers may often be deceived because the training created artificial blind spots.
- D. Courtroom procedure of cross-examination introduces another source of errors.
- E. The whole personality of the observer is reflected in what he sees and in what he remembers.

VII. Effective memory training is training in noticing, organizing, and using new material.

- A. Analysis of one's own mental habits helps in the development of devices for training memory in general situations.
- B. Principles of study should be learned.
- C. Material should be studied in spaced intervals.
- D. Systematic review by use should be carried out.
- E. Material should be made vivid.
- F. Pleasantness of the material is important for learning and retaining.



Name Section Date

Do these exercises after you have read Chapter XV. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

— 1. Which three of the following denote memory methods?

(a) prompting (b) compound ideas (c) transfer (d) spacing (e) memory span (f) saving (g) double task (h) regression.

— 2. There is "transfer of training" from one activity to another only if they involve

(a) the same faculty (b) the same kind of imagery (c) identical or similar elements (d) "dominant" activities (e) similar motives.

— 3. Interference due to activity following the original learning seems to affect principally

(a) retention (b) recall (c) transfer (d) task analysis (e) lower-order conditionings.

— 4. If, after learning a list of nonsense syllables, the subject learns another list of similar syllables, recall of the first list is

(a) termed paired association (b) a mathematical function of the total difficulty of the two lists (c) dissociated (d) impaired (e) improved.

— 5. In learning, better results are usually obtained with

(a) spaced than with continuous learning (b) part than with whole learning (c) silent reading than with recitation (d) rote than with meaningful material (e) the subject in a completely relaxed condition.

— 6. Which two of the following factors reduce the rate and amount of forgetting?

(a) overlearning (b) vivid or meaningful associations (c) retroactive inhibition (d) confuxion (e) delayed reactions (f) equivalence of stimuli.

— 7. Which of the following memory methods shows the greatest percentage of material retained when the test is made one or two days after learning?

(a) memory span (b) reconstruction method (c) saving method (d) recognition method (e) the method of retained members.

— 8. In the saving method we measure

(a) the number of items retained (b) the difference between number of items recognized and number of items recalled (c) the advantage gained by learning in reversed order (d) the number of repetitions to learn compared with the original learning (e) the difference between trials to learn in "part" and those in "whole" learning.

— 9. In the prompting method, we measure

(a) the promptness of the subject's response (b) the number of items he can promptly recall (c) the number of items he can readily recognize (d) the number of prompts required to learn the material (e) the memory span.

— 10. The memory method which most clearly resembles the type of memory involved in recalling a person's address is

(a) the memory span method (b) the paired associates method (c) the reconstruction method (d) the method of minimal change (e) the part-whole method.

Chapter XVI

Try to answer these questions before you read Chapter XVI.

Of what importance is speech in thinking?

How does a child learn adult concepts?

Explain what is meant by "abstract" thought.

What is "scientific thought"?

Describe thinking without words.

When we speak of trial-and-error behavior, what do we mean?

Random behavior is not really random. Explain.

What different stages do you go through when you try to solve a problem in mathematics?

CHAPTER XVI—THOUGHT

- I. Thought involves all those processes by which the answer is found to a problem.
 - A. Needs or motives are related to the process of thinking.
 - B. Thinking, in its simplest form, may be regarded as controlled association.
 1. A present stimulus is involved, providing a "set."
 2. A response to a stimulus remote in time or space, or both, is involved.
 3. Thinking seems similar to the delayed response task.
 - C. The more complex phenomena of thinking involve a variety of psychological processes and not just one "process of thinking."
 - D. Abstract thinking depends on concepts.
 1. The tendency to behave in the same way when objects have certain similarities is called a recept.
 - a. A stimulus may be varied and still evoke a given response.
 - b. A stimulus must be varied within certain limits only, to evoke a given response.
 2. When the characteristics of common stimuli for a given response are given a differentiating name or label, a concept is formed.
 - a. Concepts depend on words or other symbols.
 - (1) Verbal formulations may pattern memories of seen objects.
 - (2) Images often serve for the formation of concepts.
 - (3) The "double" use of labels introduces difficulties for the development of concepts.
 3. Concepts are not often formed when the situation is so simple as to allow a satisfactory response on the basis of direct perceptual analysis.
 4. Children take many years to learn to use adult concepts.

- a. Children's development of distinction between living and non-living has been studied.
 - (1) The child is at first animistic; everything is alive and conscious.
 - (2) At the second stage, about 5, objects are alive if they move.
 - (3) At about 12, the adult mode of thought is reached; plants and animals are alive.
- b. Piaget demonstrated the late development of "logical" thinking.
 - (1) The child is egocentric.
 - (2) Sheer lack of experience with given subject matter may account for many logical errors.
 - (3) Children think what they want to think, a tendency present in adults as well.
5. For some activities abstractions are less efficient than concrete examples, for other activities the reverse is true.
- E. Certain steps are always involved in "scientific thought":
 1. Observation
 2. Classification of observations
 3. Formulation of tentative hypotheses
 4. Further observation to test hypotheses
 - a. Under analysis, all these steps represent combinations of familiar psychological processes.
- II. By different people, one thing may be thought of in many different ways:
 - A. In symbols:
 1. Any image is a symbol.
 2. The meaning of a symbol is what it stands for in terms of action.
 - B. Partly in terms of muscular sensations:
 1. Meaning depends partly on attitudes and expectations.
 2. Attitudes and expectations seem partly made up of muscular sensations.
 - C. There are great differences in the imagery of different people.
 1. Abstract thinkers are weak in imagery.
 2. Artists may have no visual imagery.
 3. The muscle sense may serve for these people.
 - D. Mental sets or controls which guide mental processes may be unconscious.
 1. For judgment, the things being compared need not be present in consciousness.
 2. In word association experiments, there need be nothing in the consciousness of the subject that stands for the control (the nature of the association for which the subject will search).
- III. The processes of problem solving are similar to the processes of motor learning.
 - A. There is much trial-and-error activity in thinking.
 1. Children's responses in problem situations may be grouped in several ways for experimental analysis:
 - a. Absence of an attempt to solve the problem

b. Presence of an attempt to solve the problem:

- (1) Primitive responses
- (2) Random responses
- (3) Exploration, and trial-and-error elimination of false starts. The more difficult the situation, the more frequent this response.
- (4) Immediate solution.

c. Two types of attitudes, both leading to similar types of responses:

- (1) Spectator behavior
- (2) Participant behavior.

2. The trial-and-error may be overt or internal.

3. Benefit from "thinking out" may occur at a time later in the performance than when the thinking process occurred.

B. Behavior is not random; sets or controls provide the framework within which the trial-and-error responses are made.

C. The directive sets may be faulty and success impossible until the set is changed.

D. There may be analysis and reorganization.

1. Verbal clues are important in facilitating the process of analysis.

2. Thinking cannot be wholly explained by associations.

3. The insights may be partial or complete.

4. Insights may be correct or faulty.

5. Insight is dependent to a large degree on familiarity with the task.

6. New ideas usually depend on insight.

IV. Problem solving involves processes which may be conceived of as levels of behavior.

A. Motor trial-and-error is overt struggle rather than thought.

B. Problem solving through images of the materials used is primitive reasoning.

C. Problem solving through the use of verbal symbols is conceptual thinking.

D. These levels of behavior do not usually occur separately.

V. It has been suggested that thinking is dependent upon, or is, speech.

A. Thought, studied in the life history, develops from the overt speech of the child.

B. "Behavioristic" theory states that thinking is a bodily activity standing for action, involving chiefly the throat muscles of speech.

1. Some studies favor this view of thinking.

2. There does seem to be some relation between mental processes and muscle movement.

3. Muscle movement alone does not seem to be an adequate explanation of all the phenomena involved in thinking.

4. The problem of the precise physiological nature of thinking is still unsettled.

Name Section Date.....

Do these exercises after you have read Chapter XVI. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

1. In thinking there is
 (a) no motivation (b) unguided associations (c) random responses (d) overt trial and error (e) much internal trial and error.
2. A new idea depends on
 (a) a long rest (b) analysis and reorganization (c) perception on the first of the three stages (d) the first level of problem solving (e) a new visual field.
3. Insight is dependent to a large degree on
 (a) familiarity with task (b) chance shifts in perceptual field (c) random response (d) inherited intelligence (e) social intelligence.
4. Abstract thought depends on
 (a) receipts (b) synæsthesia (c) characterizing common stimuli with a label (d) using algebraic symbols (e) elimination of subliminal lip movements.
5. The use of abstract symbols such as "Mr. X" and "Mr. Y" is
 (a) always more confusing than the use of concrete symbols (b) more difficult when the symbols also stand for concrete objects (c) usually easier than the manipulation of concrete things (d) valuable in logic but useless in scientific problems (e) particularly common in autistic thought.
6. In studying the solution of mechanical puzzles by human subjects it has been found that
 (a) verbal cues are unimportant (b) no overt trial-and-error behavior occurs (c) considerable internal trial-and-error behavior occurs (d) the solution is principally guided by kinæsthetic sensations and images (e) "insight" is rare.
7. The simpler forms of thinking are
 (a) deductive (b) animistic (c) of the nature of controlled associations (d) inductive (e) free from images.
8. The highest level of problem solving is
 (a) use of internal trial and error (b) use of motor trial and error (c) use of images of the material used (d) use of library facilities (e) use of verbal symbols.
9. The behaviorists believe that thinking is
 (a) primarily a matter of internal speech (b) association by images (c) essentially inductive (d) essentially deductive (e) based on perceptual reorganization.
10. The two fundamentally distinct attitudes observable in subjects trying to solve difficult problems are
 (a) spectator (b) imaginer (c) thinker (d) specific reflex (e) participant (f) mass response.

Chapter XVII

Try to answer these questions before you read Chapter XVII.

- "Can you imagine that?" Why should people have difficulty in imagining things? Where do authors of fantastic stories get their ideas? Think what you will be doing next summer. What are the mental processes and content of such thinking? What is the stuff of which dreams are made? What is the difference between day and night dreaming? Account for nightmares. How are inventions made? What is there about some people that makes them become inventors?

CHAPTER XVII—IMAGINING, DREAMING, INVENTING

- I. The processes involved in imagining, dreaming, and inventing are those which were considered in connection with memory:
 - A. Association:
 1. Free association
 2. Controlled association.
 - B. Important in dreaming and invention is dissociation, the "breaking up" of the mind.
 1. Parts of the mind are capable of functioning without the rest.
 2. Under special conditions, certain parts of the mind may be "blocked off."
 3. Under such conditions, mental processes are not much changed, but the mental content may be very different from what it might normally be.
- II. Imagination involves the manipulation of images, differing from thought in that it ordinarily involves the presence of numerous possible solutions of a problem, whereas thought involves but one solution.
 - A. Imagination depends on what has been taken in through the senses.
 1. Images are the residues which lag behind after sensations themselves have faded out, an experience similar to sensory experience.
 2. Some observers report that the imagining comes as a whole without any images.
 3. Most observers report that words play an important part; the more complicated the thing imagined, the more essential words are.
 - B. We imagine in order to satisfy needs.
 1. Imagination is a mode of adaptation arising from tensions or wants.

2. The process of trial-and-error activity found in the study of learning occurs.
3. We imagine things because we want them, or fear them, or are excited or interested by them.
 - a. Imagination is a device for attaining unattainable goals.
 - b. Children early learn that satisfaction is to be derived from symbols.
 - c. Many adults derive satisfaction from their "castles in Spain."
4. Imagining is bound up with the entire system of motivation.
- C. Richness of imagination has been shown to be related to mental growth.
- D. There are two important facts to be considered in creative imagination:
 1. Large quantities of previous experience may be organized and used to meet an urgent need.
 2. Organization depends upon selection.
 - a. Selection is governed by psychological laws found operating in other fields surveyed.
 - b. The psychological laws are ultimately based on physiological facts.
- E. Imagining has been studied in various ways.
 1. A simple way is through the ink-blot test.
 - a. The application of the laws of free and controlled association was demonstrated.
 - b. The importance of control was revealed.
 - (1) Directive tendencies give greater fertility of ideas in some areas.
 - (2) Such tendencies interfere with the appearance of ideas in other areas.
 2. Dreams offer opportunity for the study of imagination subject to only slight control.
- III. Subconscious processes are processes which lie outside a conscious or introspectable real; they may be dissociated from the normal integration.
 - A. The relation between dissociated processes and consciousness is disputed.
 1. Some believe that under special conditions dissociated functions may remain conscious, though severed from ordinary personal consciousness.
 - a. Prince felt that subconscious activities were similar to conscious activity, not just automatic physical acts.
 2. Some feel that subconscious activities involve no consciousness whatever.
 - a. They may represent impressions which were originally merely physiological.
 - b. Later activity may only represent the touching off of verbal reactions representing the physiological dispositions rather than any consciousness.
 - B. Dissociation may occur in perfectly normal people:
 1. The unconscious cerebration in sleep

2. Forgetting of episodes involving emotional experiences
3. Almost every absent-minded and automatic act.
4. Special psychological states, utilized so as to explore that which the conscious mind cannot recall:
 - a. Automatic writing:
 - (1) Planchette writing
 - (2) Ouija board.
 - b. Crystal gazing
 - c. Listening to a conch shell

C. Dissociation probably exists in at least three forms.

1. Part of the mind incapacitated (as through sleep, drugs), but the rest continuing at work (e.g., dreams, delirium).
2. Physiological activities in the central nervous system more or less similar to those which occur in connection with consciousness yet under special conditions may be unaccompanied by any kind of consciousness which the individual can report (e.g., many absent-minded activities).
3. Instances when prolonged periods of unconsciousness are followed by prompt and effective behavior which could not have been carried out in the interval before unconsciousness commenced (e.g., solutions to problems coming in states of absolute unconsciousness).

D. Dissociation frees part of the mind for imaginative effort.

1. New attitude or new mood may develop which permits new approach to problem.
2. Reorganization in the perceptual field may occur.
 - a. Reorganization involves what is in the mind at a given time.
 - b. Material which is reorganized may include far more than ever can be held in consciousness at any one moment.
 - c. The whole viewpoint may suddenly change.

IV. Dreaming is simply imagining while one is asleep.

- A. Dreams occurring while one is asleep represent imagining under conditions of a minimum of the critical attitude ordinarily imposed by contact with the world.
- B. Dreams vary in the controls existing and directing the associations occurring.
 1. There is the rambling, confused dream of relatively free association.
 2. Fearful or wishful dreams represent very definite controls.
 3. Many dreams are largely the result of physical stimulation.
 - a. There are usually many changes of posture during the night.
 - b. Dreams may magnify or elaborate simple stimuli.
 - c. Dreams may represent the completion of patterns the chief parts of which are due to these physical stimulations.
- C. The theory has been put forward that in dreams the whole brain is not asleep; some parts are asleep, other parts are awake.
 1. The fact that most of the brain is asleep will alter the course of associations.

2. Physical stimuli start trains of association that are "different" because the normal pathways are blocked off.
 - a. "Pathways" is not a term designating the dynamic relations between successive activities.
 3. Sleep may act similar to those drugs which remove self-consciousness and inhibitions.
- D. Freud has suggested a difference between children's and adults' dreams.
1. Freud maintains that children's dreams are practically always direct wish-fulfillments.
 2. There seems reason to doubt, however, whether wish-fulfillment is a universal characteristic of dreams at any age.
 3. The data are as yet incomplete.
- E. It has been suggested that terror dreams represent learned responses of the organism to situations which are uncomfortable or dangerous.
- F. The vividness and realism of dreams are dependent on the shutting out of all that might contradict their story.
1. This represents a splitting of the personality into two or more systems, one being free from the control of the others.
 2. This phenomenon of dissociation is of major importance in the whole life of the imagination.
- V. There are four major processes usually involved in invention:
- A. Recognition of a need:
1. Need may be for an instrument or a chord or color.
 2. Need arouses mental set which guides mental processes.
 - a. The directive tendency may be a mood.
 - b. Much of the work of the artist is dependent on emotional responsiveness.
 3. Need may be felt so strongly as to be a compelling force, a tense state of concentrated direction toward a goal.
- B. Reflection on ways of satisfying the need:
1. Preoccupation with a given material involves limiting the field of operations.
 2. Such limitation is the basis of most dissociations.
 3. One learns to invent, to combine ideas in fruitful ways within a given field.
 - a. At the beginning there is much trial-and-error behavior.
 - b. Later on, there is the equivalent of the formation of higher units as considered in the learning of telegraphy and type-writing.
- C. A glimpse of a solution, illumination:
1. Illumination is the act of gaining sudden insight.
 - a. It is often described as reorganization in the perceptual field.
 - b. It is frequently reorganization of material held in the imagination.
 - c. Materials outside of consciousness play a large part in the contribution to the insights of illumination.

2. Illumination is frequently accompanied by a feeling of satisfaction.
 - a. Sudden insights are not infallibly correct.
 - b. The sense of satisfaction may be felt even though a correct solution has not been really achieved.
3. Illumination depends on all the factors which govern free and controlled association.

D. A period of "hammering out":

1. The sudden insight must be adjusted and perfected to make it workable.
2. There is a great deal of variation in the amount of "hammering out" needed.

NameSection Date.....

Do these exercises after you have read Chapter XVII. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

- 1. A test of imagination is
(a) the wire puzzles (b) the ball and tether (c) the ink blots (d) operatic pantomime (e) the campaign platform.
- 2. Imaginative patterns usually consist of
(a) trains of words and images (b) muscular tensions (c) dissociated figments (d) latent activities (e) imageless visions.
- 3. Thinking for the pleasure of thinking is
(a) a directive tendency in children (b) free association (c) an example of pre-logical thought (d) autistic thought (e) predominantly animistic.
- — —4. Inventiveness and creativeness have been studied by three methods
(a) biographies of men of genius (b) method of paired associates (c) questionnaires and interviews (d) the saving method (e) laboratory studies of complicated tasks.
- —5. For which two of the following has an explanation in terms of "dissociation" been stressed?
(a) prelogical thought (b) contiguity (c) automatic writing (d) creative activity (e) dreaming (f) hoping.
- 6. William James explained dreaming as due to a restriction of normal free association because of
(a) blocking of some brain pathways (b) physical stimulation (c) autistic thinking (d) action potentials (e) animistic tendencies.
- 7. According to Freud, children's dreams differ from those of adults mainly in the fact that
(a) they are non-sexual (b) they are exclusively sexual (c) they express wishes directly without disguises (d) they are less meaningful (e) their genesis is more difficult to discover.
- 8. Nightmares are governed by, generally,
(a) free association (b) physical stimulations (c) muscle tensions (d) partial suffocation (e) haunting fears.
- 9. The subconscious can be tapped by means of
(a) séances (b) cards (c) reading the eyes (d) introspection (e) planchette writing.
- 10. The work of Edgar Allan Poe demonstrates the great influence on creative work of
(a) mood (b) study of history and science (c) sleep (d) classification of things observed (e) imageless thought.

Chapter XVIII

Try to answer these questions before you read Chapter XVIII.

1. What does it mean to be intelligent?
2. How would you pick out the most intelligent child in a school, taking into account differences in age?
3. What is the value of a good test of intelligence?
4. What part does intelligence play in achieving success in our society?
5. How does the mentality change as a person gets old?
6. Describe and account for mental differences between boys and girls.

CHAPTER XVIII—INTELLIGENCE TESTS

- I. A survey of the history of intelligence tests shows the tentative character of the material included.
 - A. Binet and Simon published their first scale in 1905.
 - B. This test was revised in 1908.
 - C. Binet produced another revision in 1911.
 - D. The tests underwent translation from the French, and various revisions:
 1. Stanford University revision in 1916
 2. Another Stanford revision is in preparation.
- II. Tests such as the Binet introduce concepts of level of intelligence and scatter of performance.
 - A. Level of intelligence is defined in terms of the average performance on set tasks of children of known chronological (life) age.
 1. Correct performance of some tasks may be expected of children of one age.
 2. Children a year older may be expected to perform more difficult tasks correctly.
 - B. Scatter of performance involves the correct performance of some tasks at levels higher than that at which all the tests set can be performed.
 1. The level at which all the tests are correctly performed is the "basal age."
 2. To the basal age is added credit for each test passed at higher levels.
 3. The sum total of all the credits, awarded in terms of months, is the "mental age."
 - a. Because of differences in the amount of scatter, children may be assigned the same mental age though they have made quite different performances.
 - b. Mental age means little except in relation to chronological age.

- C. The intelligence quotient (I.Q.) measures the rate of intellectual growth.
 - 1. The I.Q. is the mental age divided by the chronological age.
 - 2. From the I.Q. one can predict fairly well from year to year what the mental age will be.
 - 3. The I.Q. is an index of general development but gives no cue to special abilities or evenness of development.
 - a. It is probably the most significant brief statement about an individual's intellectual ability.
 - b. It must not be considered a complete description.
- III. The Binet test is chiefly verbal; tests have been devised to supplement such a test by involving other mental skills—performance tests.
 - A. These tests usually involve perception and manipulation of objects.
 - 1. They involve grasping of relations.
 - 2. They may be more or less complex.
 - B. Children's drawings are used as measures of mental development.
 - C. The Knox Cube Test involves the perception of time as well as space relations.
 - D. Mechanical abilities tests have been developed which predict to some degree vocational aptitude later shown in the mechanical field.
 - 1. In a recent study of mechanical tasks, intelligence tests seemed to predict success in early stages of learning, and tests of mechanical ability seemed to predict the limits of development.
 - 2. This ability is not wholly the result of training.
- IV. Many tests must be given to each individual separately, but group tests have been developed which permit the testing of large numbers of individuals at once.
- V. Curves of general mental development have the shape of curves of diminishing returns; there is at first a rapid gain which gradually slows down from year to year.
 - A. The rate of intellectual growth is hard to study.
 - 1. We are uncertain as to the true units in which to measure increase in mental growth.
 - a. We do not have a real zero point.
 - b. The base line is doubtful.
 - 2. Without the zero point and equal units, we cannot tell the true form of the curve.
 - B. Errors in sampling increase the difficulty of the study of intellectual growth.
 - 1. The data are reasonably complete on growth in terms of standard tests through the fourteenth year.
 - 2. The importance of individual differences in development from fourteen to twenty is still uncertain.
 - C. Intellectual maturity in the sense of all-round capacity to learn to solve problems and to handle new situations probably reaches its high point in the late 'teens.
 - 1. Some functions involving speed seem to fall off almost immediately thereafter.
 - 2. Some other functions seem to show no loss till later.

3. Others are but little affected till later.
4. Some generalizations seem reasonable in the light of experimental evidence.
 - a. Vocabulary and information tests are least influenced by the passing of years.
 - b. Tests involving learning ability show the greatest decline.
 - c. Much depends upon the technique of investigation used.
 - d. There seems to be a definite optimum for the development of each perceptual and motor skill.
5. Psychologists have made less progress in measuring the general intellectual capacity of adults than that of children.
6. The tests developed for the measurement of infants have been found to have but little relation to later performance of the children on standard intelligence tests.
 - a. Accurate testing can be made when a child is four or five, normally.
 - b. Tests made earlier than this are likely to be inaccurate.

VI. Psychological tests, in general, have shown no important differences between the sexes.

- A. In both general ability and in specialized tasks few differences have been established.
- B. In those few fields where differences have been reported they are probably due chiefly to training.
 1. Tests in which strength is important show some, but small, difference.
 2. Boys surpass girls on most information tests and tests of ingenuity and reasoning.
 3. Girls surpass boys in vocabulary and in grammar.
 - a. During the school years they are usually well ahead in spelling and history.
 - b. Girls excel in most subjects where use of words is important.
 4. Analysis of the tests used in the studies resulting in the reported sex differences shows a relation between materials and social and educational factors at work on children.
- C. Differences in interest do influence differently the mental habits of different people, though they probably do not alter total intelligence.

VII. Intelligence may be defined as the all-round ability to adapt oneself to new situations—the ability to learn.

- A. In studying large numbers of people, all mental abilities are found to be interrelated, according to Spearman, because of general ability.
- B. Performance supposedly indicating an individual's intelligence depends on several factors:
 1. General ability: a relatively constant degree of proficiency characteristic of an individual's performance in a rather large number of related tasks
 2. Group factors: ability characteristic of an individual's performance in a smaller number of tasks, more closely related

3. Specific factors: those special abilities and chance factors important in the particular task alone.
 - (a) These factors are involved with different degrees of importance, depending on the task considered.

Name Section Date.....

Do these exercises after you have read Chapter XVIII. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

—1. The "basal age" on the Stanford-Binet is

- (a) physiological age as determined by basal metabolism (b) the highest level at which all tests are successfully completed (c) the level of the most difficult test successfully completed (d) the age at which a child of average intelligence can pass the test (e) the age of the youngest children who can pass any of the tests.

—2. Group tests of intelligence usually emphasize

- (a) auto-criticism (b) self-direction (c) school material (d) vocabulary (e) personality.

—3. Performance tests usually involve

- (a) completion tests (b) analogies (c) arithmetical problems (d) clay-modeling (e) perception and manipulation of objects.

— — —4. Which three of the following are primarily performance tests?

- (a) Army Alpha (b) Goodenough Man-Drawing (c) Knox Cube (d) Army Beta.

—5. The intelligence quotient is supposed to measure the child's

- (a) mental age (b) variability in capacity (c) mental growth rate (d) hereditary resemblance to parents (e) amount of S.

—6. Mechanical ability is

- (a) partly innate (b) highly correlated with verbal ability (c) not related to vocational aptitude (d) a useful indicator of early stages of success in learning a mechanical task (e) impossible to test.

—7. Probably the most important group factor affecting performance in intellectual work is

- (a) speed (b) ability to see subtle analogies (c) attention (d) perseverance (e) verbal ability.

—8. Intelligence seems to cease development at about

- (a) ten years of age (b) thirteen years of age (c) sixteen years of age (d) nineteen years of age (e) twenty-two years of age.

— — —9. The two main difficulties in determining the true form of the mental growth curve are the difficulties in finding

- (a) general ability (b) group factors (c) equal units (d) high coefficients of validity (e) a zero point.

—10. According to Spearman's two-factor theory

- (a) scores are determined by the relation between "process abilities" and "subject-matter abilities" (b) intelligence is made up of a number of special abilities, at least two entering into any mental test (c) a general factor, "G," runs through all mental tests (d) intelligence is composed of overlapping group factors (e) intelligence is determined by perseveration and speed.

Chapter XIX

Try to answer these questions before you read Chapter XIX.

1. Can intelligence be inherited as such? Give reasons for answer.
2. Account for those cases where bright parents have dull children.
3. What is a moron?
4. How does epilepsy affect mental development?
5. What race differences in mentality do you know of?
6. What is the rôle of environment in mental growth?
7. What is the rôle of environment in race differences?

CHAPTER XIX—HEREDITARY FACTORS IN MENTAL GROWTH

- I. Mental traits depend in part upon heredity.
 - A. Experiments cannot get accurate results unless either environment or heredity can be held constant.
 - B. Identical twins provide subjects who have the same heredity.
 1. The two embryos develop from a single fertilized ovum.
 2. Unfortunately for experimenters, twins are frequently treated very much alike.
 - C. Special attention is given to studies of identical twins reared apart since infancy.
 1. Resemblance in physical traits is great.
 2. Resemblance in mental traits is great, but not so great as in physical traits.
 3. Environment evidently has some influence on I.Q.
 - D. Animal experiments can control both heredity and environment more satisfactorily than can studies of humans.
 1. By selective breeding, strains of bright and dull rats have been produced.
 2. Apparently hereditary factors are important in animal intelligence.
 - E. Influence of heredity on intelligence of humans may be seen in the study of case histories of families.
 1. The mechanism of heredity provides that children may resemble each other.
 2. Heredity may make a child unlike his parents.
 3. The importance of heredity is most readily seen in the case of mental defectives.
 - a. Great majority of feeble-minded cases are hereditary.
- (1) Sometimes there is unevenness in development, sometimes general retardation.

(2) Epilepsy sometimes causes scattering failure of developments, sometimes deterioration of minds.

(3) Many cases show brain defect not ordinarily considered "hereditary":

(a) Hydrocephalics: brain defect due to excessive pressure of cerebro-spinal fluid

(b) Microcephalics: brain develops to a size far smaller than normal

(c) Mongoloids: children of white parents who show Mongoloid appearance

(d) Cretins: defect in functioning of the thyroid gland.

b. For convenience those with an I.Q. below 70 are classed as feeble-minded:

(1) Morons, I.Q. 45 to 70

(2) Imbeciles, I.Q. 20 to 45

(3) Idiots, I.Q. 0 to 20.

c. I.Q. 70 to 80 are classed as borderline cases.

d. The great majority of mental defectives are physically undistinguishable from normal individuals.

II. Mental traits depend in part on the social environment.

A. Many of the elementary differences suggested by biological discussion of race differences disappear under conditions where diet or climate is constant for the two racial groups.

1. Studies of supposed intellectual inferiority of Negroes show dependence on the social factors and educational facilities.

2. Studies of race differences among subdivisions of the white race in Europe show differences among groups, but not on race lines.

3. Studies of children deprived of schooling show decline of I.Q. as children grow older.

B. Intelligence is correlated with occupation of parents.

1. There is much overlapping of intelligence of children of members of the various occupations.

2. Hereditary differences may be responsible for part of the correlation.

3. I.Q. is correlated with socio-economic status of the family.

III. Relative importance of heredity and environment varies from time to time and place to place.

A. Where heredity is similar, variation in intelligence of children is due to environment.

B. Where environments are similar, variation will be due to heredity.

C. In the United States as a whole today, variation is probably due more to variation in heredity than in environment.

D. No trait is determined by heredity alone, and none by environment alone.

Name Section Date.....

Do these exercises after you have read Chapter XIX. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

- 1. To get individuals of the same heredity we have to study
(a) identical twins (b) pure races (c) brothers or sisters (d) feeble-minded children (e) infants at birth.
- 2. Experiments with twins are frequently conducted by
(a) mingling embryos (b) placing both children in a foster home (c) holding environment constant (d) training one twin in an activity the other is not permitted to practice (e) the method of identical twins.
- 3. Selective breeding of white rats for ability in maze learning shows that maze learning ability is
(a) a group factor (b) a Mendelian factor (c) unreliable (d) hereditary (e) not inheritable.
- 4. Cretinism is due to deficiency in
(a) pituitary functioning (b) adrenal functioning (c) thyroid functioning (d) thymus functioning (e) pineal interaction.
- 5. When children are classified on the basis of the occupation of their fathers and compared in intelligence
(a) we find a difference which is purely environmental (b) we find a difference which is purely hereditary (c) there are practically no differences between any of the groups (d) there is little overlapping of intelligence between any of the groups (e) the average of the professional group exceeds the average of the unskilled labor group by a good margin.
- 6. In the United States, individual differences seem dependent chiefly on
(a) differences in heredity (b) number of children in the family (c) environmental differences (d) the month of the year in which the children are born (e) astral influences.
- 7. The majority of the parents of feeble-minded children are
(a) of somewhat lower intelligence than their children (b) near the line between normal and feeble-minded (c) epileptic (d) unhappily married (e) normal, while uncles and aunts are usually insane.
- 8. The effect of moving to the city from isolated rural districts seems to be to
(a) prove beneficial to performance on intelligence tests (b) interfere with vocational adjustment (c) cause tetany (d) cause a deterioration of mentality (e) increase acromegalic symptoms.
- 9. Which three of the following sets of groups show clear-cut differences in intelligence? (The differences need not be innate.)
(a) Nordics, Alpines, and Mediterraneans (b) American Negroes and American Whites (c) northern Negroes and southern Negroes (d) Negroes who migrated from the South to the North and those who remained in the South (e) French, Germans, and Italians (f) rural and urban groups with the same hereditary background.

—10. Race differences in sensory and motor capacity

(a) are well established and innate (b) are probably due to differences in training and interest (c) are mainly based on innate emotional differences (d) completely invalidate intelligence tests (e) support the faculty theory.

Chapter XX

Try to answer these questions before you read Chapter XX.

1. Would a man tending a moving belt or a creative artist on a job be more likely to work at maximum efficiency eight hours a day? Explain.
2. Explain how a change of subject matter may do away with so-called mental fatigue.
3. What is the relation between overwork and a nervous breakdown?
4. It is said that we sleep piecemeal. Explain.
5. Would you advise a classmate to smoke to help him concentrate while studying? Give reasons for your answer.
6. If you were the owner of a factory desiring to increase the efficiency of your plant, would you consult an engineer, a physician or a psychologist? Explain.

CHAPTER XX—CONDITIONS OF WORK

- I. Efficiency of work is interfered with by the substances liberated into the blood stream as waste products during muscular work.
 - A. The interference is due to the fact that the substances are liberated faster than they can be removed.
 1. Properly spaced rest periods can avoid much of the fatigue.
 2. Persons doing physical work may suffer mental fatigue as the brain becomes clogged with waste substances.
 - a. Sustained tension of certain muscles may give a sense of weariness though there is not a generalized fatigue.
 - b. Change of posture may give relief, showing that what seemed to be mental fatigue was really physical fatigue.
 - c. The actual amounts of energy used up in the brain are very slight.
 - (1) Much that passes for mental fatigue is really loss of interest.
 - (2) If incentives are kept constant, the loss of efficiency in mental tasks in periods of one to four hours is at the rate of one to four per cent per hour.
 - (a) Fluctuations in work output during a normal day are much more than this.
 - (b) There is generally a steaming up in work during the morning, a high point at 11 o'clock, depression before lunch, spurt between 2 and 3, a big decline through the afternoon.
 - (c) If motivation is kept strong, sheer continuance of work seems to have no effect on efficiency.

3. Obstacles in the performance of a task characteristically result in an increase in the effort.
 - a. Measurement may be made of the body's metabolism, the rate at which body energy is used.
 - b. Increased effort uses up more energy than normal.
 - c. Due to the increased effort, there may be little evidence of fatigue in the curve of work done.
 - (1) One should not depend on the increased effort to overcome obstacles to work.
 - (2) One should attempt to make work interesting rather than adjust to boring material.
- B. "Overwork" is often merely tension or worry; the term "nervous breakdown" is loosely used.
 1. Fatigue is slight in the case of intellectual operations.
 - a. A nerve is hard to fatigue.
 - b. It is the connections in the brain that get fatigued.
 2. Only about 20 to 40 per cent of nervous breakdowns are due to brain work.
 - a. These cases get so wrapped up in their work that they cannot forget it when night comes.
 - b. These conditions of brain activity go on for long periods.
 - c. The brain, getting no rest, becomes genuinely fatigued.
 3. Most cases of nervous breakdown are not of intellectual origin.
 - a. They may be due to internal disturbances, emotional conflicts, worries.
 - b. The result may look like overwork.
- II. Sleep allows body repair and the elimination of waste substances.
 - A. Sleep is primarily a physiological brain change.
 1. Drowsiness is a normal reaction to clogging of the brain with waste products.
 2. Circulatory changes are important in the process of going to sleep.
 - a. There is a condition of more than normal supply of blood in the brain.
 - b. The brain cannot function in normal fashion.
 - B. In man, sleep is greatly affected by habit and circumstances.
 1. Waste products in the blood predispose the body toward sleep.
 2. The actual behavior of the body depends on many circumstances.
 - C. We do not sleep with the whole brain all at once; the brain probably goes to sleep piecemeal.
 1. Loss of voluntary movement occurs first while imagination is still active.
 2. Various functions are lost one by one, perception of sounds being last to go.
 3. As soon as the body is relaxed it begins to undergo a specialized resting.
 - a. There are frequent changes of posture during sleep.

- b. The body seems to be resting first at one point, then at another.
- 4. Sleep is deepest after an hour or so, and the body gradually "wakes up" through the rest of the night.
 - a. Depth of sleep can be measured by measuring the intensity of sound required to awaken the sleeper.
 - b. Another method of experimenting is with varying electrical stimulation.

III. Foods and drugs affect blood chemistry and are consequently important in the study of the efficiency of work.

A. Little is known about the psychological effects of diet.

- 1. Most foods cannot be studied in relation to their immediate consequences.
- 2. The problem is complicated by variation in other aspects of a person's regimen.

B. The effects of drugs vary with the type of work and the person involved.

- 1. Caffein, a drug contained in coffee and tea (in tea, really thein), has been studied.
 - a. A small dose (the amount in average cup of coffee) has mild effects.
 - (1) Motor performances were slightly accelerated and slightly improved.
 - (2) Perceptual performances were unaffected.
 - (3) There was no loss of efficiency after the drug wore off.
 - b. Twice the smaller dose provoked muscular incoordination in many subjects and perceptual difficulties in a few.
 - (1) There was a loss of efficiency after the drug wore off.
 - c. Drug reached maximum effect one to four hours after taking and then gradually passed off.
- 2. Pyradine is the drug which affects smokers.
 - a. The effects of tobacco smoking are interwoven with effects of suggestions.
 - b. Experimental study of pipe smoking showed very slight effects:
 - (1) Slightly unfavorable effect in simple perceptual and motor tasks
 - (2) Slight loss in delicate eye-hand coordination
 - (3) No measurable effect in more complicated mental functions.
- 3. Alcohol lowers efficiency in most functions.
 - a. Even slight doses produce marked sensory and motor disturbances.
 - b. Frequently, emotional difficulties may be removed by alcohol.
 - (1) There may be a loss of self-consciousness, self-reproach, etc.
 - (2) Removal of inhibitions and blocking may account for stimulating psychological effects in some people.

- IV. Studies have been made to increase efficiency of industrial organizations.
- A. Study of slow-motion pictures of skilled workers leads to elimination of waste.
 - B. Studies have been made of factors involved in industrial accidents.
 - C. Health and personality factors are probably more important than impersonal factors making for safety, and more important than the physiological factors discussed above.

Name Section Date

Do these exercises after you have read Chapter XX. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

—1. Drowsiness is primarily a reaction to

- (a) overconsumption of energy (b) clogging of the brain with waste products (c) lowering of thresholds in the sleep center of the brain (d) onset of darkness (e) rhythmic motion.

—2. One of the most typical characteristics of sleep is

- (a) a decrease in the amount of blood in the brain (b) general immobility (c) frequent changes of position (d) increased imaginative faculties (e) metabolic deterioration.

—3. Depth of sleep is commonly measured by

- (a) amount of dreaming (b) steadiness on waking (c) blood volume in the brain (d) susceptibility to suggestion (e) stimulus intensity required to waken the sleeper.

—4. In most cases muscular fatigue is due largely to

- (a) nerve fatigue (b) boredom (c) loss of muscular elasticity (d) fatigue of brain connections (e) accumulation of waste products.

—5. The decline in the efficiency of continued mental work seems principally due to

- (a) accumulation of waste products (b) neural fatigue (c) boredom (d) excessive metabolism (e) decreased blood pressure.

—6. In studying muscular work and fatigue we use

- (a) the Dunlap chronoscope (b) the plethysmograph (c) the comptometer (d) the Mosso ergograph (e) the pneumograph.

—7. The rate of energy consumption in an organism is usually measured in the laboratory by means of

- (a) oxygen consumption (b) heat output (c) work performed (d) work decrement (e) muscular tension.

—8. One method which has been widely used for eliminating waste in industry involves

- (a) detailed photographic analysis of the worker's movements (b) the use of fatigue-neutralizing stimulants (c) a sleep period during the noon hour (d) increasing the worker's metabolic rate (e) decreasing the worker's metabolic rate.

—9. The stimulating effect of alcohol seems to be due to

- (a) increase in oxidation (b) removal of inhibitions (c) direct stimulation of neurones (d) enlargement of the arteries of the head (e) setting up of action currents.

—10. Which three of the following produce unsteadiness and muscular incoordination?

- (a) pipe smoking (b) a cup of coffee (c) a small dose of alcohol (d) pyridine (e) a cup of tea.

Chapter XXI

Try to answer these questions before you read Chapter XXI.

What do we mean by "personality"?

Do you think there is a "city personality" and a "country personality"? Explain.

In what way is a child's position in the family influential in the development of his personality?

How would you describe the well-adjusted person?

A child is said to have "his father's temper." How did he get it?

Why is it that children born to the same family often develop entirely different personalities?

How much of our personalities do we inherit?

CHAPTER XXI—THE DEVELOPMENT OF PERSONALITY

I. Personality depends on both heredity and environment.

A. All differences in personality reflect individual differences in environment.

1. The variety of patterns in the environment determines the kind of development biological tendencies may show.
2. There exist vast differences in the personalities of members of different tribes of primitives which are constitutionally similar.

B. Biological factors determine in large part thresholds for response and therefore the selection of stimuli to which the organism responds.

1. Some personality traits appear too early and in too definite a form to be explained by environmental factors.
2. Constitutional factors in personality are related to the make-up of the nervous system, glands of internal secretion, unstriped muscles, the factors on which emotional responses depend.
3. What the environment can make out of a person depends partly on what he is at birth.

C. The degree to which an individual can adapt to the changing patterns within, or to the permanent pattern of, any social group, is determined by individual constitution.

D. Development of personality depends on the learning processes.

1. Responses become conditioned to the social stimuli of the child's world.
2. Patterns are organized from the random responses of the infant.
 - a. The patterns may be broken down and reorganized.
 - b. The tendency is toward stable and complex patterns.
 - c. Habits represent patterns several stages higher than the simple conditioned response.

II. A general outline of the development of children in our society can be drawn.

A. An important phase in the very early perceptual development of the child is the building up of the subjectively unified pattern called "the self."

1. The operation of social forces is important, though it may not be wholly due to such forces.
2. Localization of self depends on experience.
 - a. Sense of self seems definitely localized for most people.
 - b. Localization of the self outside the body is not unusual.
 - c. Thought is at first usually attributed to the mouth; it takes several years before it is conceived as within the head.
 - d. Dreams are conceived as "out there" until about the age of ten.
3. The small child, unable sharply to distinguish self from not-self, is "egocentric," uses speech for his own ends without any special reference to the hearer.
 - a. Most of the language of the two-year-old is choppy, with little desire to convey meaning to others.
 - b. The speech of the two- and even three-year-olds serves several functions.
 - (1) Speech is used primarily for the fun of talking.
 - (2) Praise is gotten as new words are mastered.
 - (3) Speech serves as an aid in keeping attention directed toward something wanted.
 - (4) Speech may be simply a part of the total activity pattern being carried out.
 - c. At about six years of age speech reveals a grasp of the point of view of the other person.
4. The child without clear distinction of self shows primitive sympathy.
 - a. Part of the responses of this type are due to circular reflexes.
 - b. Part of these responses are due to an identification with all about the child, due to lack of distinction of a self.
 - (1) With the development of self, people become detached more and more.
 - (2) Most people come to evoke a neutral or hostile attitude.
 - (3) The child continues to identify himself with those with whom he is closely connected.

B. The transition from early to middle childhood shows some interesting phenomena.

1. There is a characteristic expansion of curiosity.
 - a. At about three years of age, How, Where, and When questions are asked.
 - b. At about four, Why questions become dominant.
2. There is the development of a competitive attitude.
 - a. Children of three and four begin to grasp the idea of surpassing another.
 - b. Individual success in the eyes of others is sought.

- c. Practically nothing is done as well alone as in a group doing the same thing.

III. In our society there are large individual differences in personality.

A. Individual differences in personality have been studied in a variety of ways.

1. Experimental situations have been standardized and children's behavior recorded.
2. The "short sample" technique of observation has been developed.
3. The case study, a sort of scientific biography, has been used.
 - a. General laws of development are sought.
 - b. Understanding of particular characteristics of a given individual is desired.
 - c. Unique characteristics of a given individual are only unique organizations of traits which have developed in accordance with general law.

B. Children have been called extravert and introvert.

1. The extravert directs his energy outward, is interested in the things and activities of the world about him.
2. The introvert is interested and absorbed in himself; his emotionally aroused energy is devoted to activities which are invisible to outside observers.
3. Experiments have justified the application of these concepts, even to young children.

C. Children's conformity to ethical codes has been studied.

1. The most systematically, quantitatively explored traits are honesty, generosity, self-control, and persistence.
2. When analyzed, each trait seems to exist psychologically as well as socially.
3. Comparing the four traits, a general character factor was found that ran through each trait.
4. Constitutional factors seem unimportant in the development of such traits.
5. While many factors are important, the most important influence seems to be the type of neighborhood from which the child comes.

IV. Personality is organized largely in terms of internal control, the will.

A. Two factors are important in the mobilization of the self in an activity:

1. The self-regarding sentiment, the series of experiences relating to the goals or standards of an individual
2. The use of internal symbols which reinforce adjustment:
 - a. The symbols are chiefly verbal.
 - b. There may be muscular adjustments or imagery other than verbal.

(1) The reaction-time experiment, testing the swiftest voluntary response to a stimulus, shows the importance of muscular set as well as the verbal symbols.

(2) These experiments show the difficulty of stating just what is voluntary.

- (a) What seems to be involuntary is really under some degree of voluntary control.
 - (b) An act may be performed though the individual did not mean to do it.
- B. It is possible to acquire voluntary control over involuntary muscles.
 - 1. Through a series of conditionings, the pupillary response was brought under voluntary control through internal speech.
 - 2. Conditioning to the internal changes is the thing ordinarily meant when we speak of volition.
- C. The development of language and other symbolic process is basic for the development of goals, ideals, and the will.

Name Section Date.....

Do these exercises after you have read Chapter XXI. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

—1. Two-year-old children use speech primarily

(a) for the fun of talking (b) for communication and asking questions (c) to show primitive sympathy (d) because of the oral eroticism (e) to refer to themselves.

—2. During the first two years of life emotional responses

(a) can be divided into the two types of laughing and crying responses (b) are not integrated with the personality (c) are simple responses to unitary stimuli (d) seem to be very constant for a given individual (e) cannot be studied in the laboratory.

—3. The development of personality in children is toward

(a) mass responses (b) rather stable and complex patterns (c) definite specific-stimulus-response connections (d) loss of fear of snakes and lightning (e) increased introversion.

—4. Piaget found that children

(a) tend at first to regard themselves as the only conscious beings in the universe (b) tend to verify the double-aspect theory of consciousness (c) fulfill their wishes by means of exaggerated dissociation (d) tend to interpret nature in animistic terms (e) have a natural creative tendency which is suppressed by training.

—5. By primitive sympathy in children we understand

(a) the sympathy for primitive peoples which develops as a result of religious training (b) the tendency of children to join in the emotional expressions of those about them (c) the undeveloped sexual impulse (d) the emotional similarity of children and primitive peoples (e) the innate tendency of very small children to play together in groups.

—6. Voluntary control over pupillary contraction and dilation was established by

(a) saying "contract" and "dilate" until the pupil responded (b) squeezing a dynamometer until the pupil responded (c) conditioning the pupillary light reflex to subvocal stimuli given by the subject (d) increasing the latency of the pupillary light reflex (e) using the choice reaction time technique.

—7. An important feature of preparation for a reaction is

(a) kinæsthetic imagery (b) tension (c) pupillary dilation (d) action of the parasympathetic nervous system (e) psychasthenia.

—8. A central problem in the study of will is

(a) the time of volition (b) the law of effect (c) empathy (d) the phiphenomenon (e) the use of internal verbal symbols.

—9. In most people the self is

(a) poorly developed (b) indefinitely localized (c) definitely localized (d) something apart from and outside of the body (e) animalistic.

—10. An individual who is absorbed in things and activities in the world about him is called

(a) extraverted (b) introverted (c) volitional (d) integrated (e) diffused.

Chapter XXII

Try to answer these questions before you read Chapter XXII.

What can you tell about a person just by looking at him?

What is the use of measuring personality?

How would you go about measuring a man's tact?

How would you go about measuring a man's attitude toward prevalent economic conditions?

Which tells us more about a man's true personality, what a man does or what he says? Explain your answer.

List five fundamental personality traits and indicate how each might be measured. "You're just the type." Analyze critically what "type" means.

CHAPTER XXII—THE MEASUREMENT OF PERSONALITY

- I. Character and personality cannot be read "at sight," but can be measured.
 - A. Character reading which depends upon anatomical characteristics is unsatisfactory.
 1. Little confidence can be placed in character-reading methods.
 2. Studying and learning to interpret emotional expression can be of great value.
 - a. The study of posture and mannerisms may offer clues to personality.
 - b. The study of handwriting does offer some fruitful suggestions.
 - (1) Handwriting depends partly on the anatomy of the hand and arm.
 - (2) Handwriting is an expressive movement of the organism.
 - (3) Experts can match handwriting samples to personality sketches better than can be accounted for by chance.
 - (4) There do seem to be sex differences which may be due to differences in ideal handwriting for boys and girls learning to write.
 - (5) The whole matter of how to interpret handwriting is still obscure.
 - B. Many differences between personalities can be stated in terms of degree, can be measured.
 1. Both rating scales and questionnaires seek knowledge of a general trait by asking about specific forms of behavior which exemplify it.
 2. Rating scales can be used to quantify traits we cannot really measure.
 - a. Almost never used if good objective measurement is possible.
 - b. Self ratings are useful for traits dependent on inner activities.

c. Ratings by persons who know the subject well are useful for social traits.

- (1) Consistency of ratings can be checked by rerating after an interval.
- (2) Ratings of independent judges can be compared.
- (3) Ratings on supposedly "identical" traits can be compared.
- (4) Usual errors that creep in can be minimized.
 - (a) Get judgments from at least three independent raters.
 - (b) Find the traits which particular raters can judge most consistently.

d. Ratings may be used to study the rater.

- (1) The psychology of rating points to existence of "stereotypes."
- (2) Ratings serve to study degree to which common biases are held.

3. Questionnaires composed of a series of questions related to a central problem are useful.

a. Questionnaire studies are notoriously subject to sampling errors.

b. Emotional characteristics and attitudes are most frequently studied by the use of questionnaires.

- (1) Private, personal information can be gotten by this method.
- (2) Anonymity of the subject can be guaranteed, eliminating distortion of information.

c. Extraordinarily high consistency is obtained from this method.

d. Attitude tests can be used to study the forces molding public opinion.

- (1) Propaganda effects can be studied.

- (2) Most attitudes have been found to be determined largely before adolescence, and largely by irrational methods.

4. Tests of personality as shown by overt behavior in laboratory situations have been developed.

a. Standardization of such tests is difficult.

b. Reliability of the tests, the degree to which test items point consistently in the same direction, is low.

c. Results, up to now, have seemed more clear cut from the paper-and-pencil forms of inquiry.

II. Psychologically defined traits depend ultimately on drives.

A. Socially given names, though useful, do not necessarily describe psychologically unitary traits.

1. There is a difference between usefulness of a term and its significance as a valid clue to the true functional units out of which behavior is made.

2. We can measure traits and use measurements, but we still know little about fundamentals.
 - a. We don't know how traits are really made up.
 - b. We don't know the appropriate units of analysis in getting at the fundamental structure of personality.

B. A personality trait might consist either of a simple drive, a group of drives, or of one or more drives in relation to particular situations.

1. The human organism is exceedingly plastic and modifiable.
2. All sorts of combinations of tendencies are possible.
3. The combinations are dependent upon the interaction of the organism and the environment.

C. The raw material of human nature is the same from one person to another, qualitatively.

1. Differences between people are in terms of degree rather than kind.
2. The basic trends, from which personality is formed, are the products of the evolution of the human race but may be variously modified in individuals.
 - a. They may be modified by conditioning.
 - b. Higher units may be formed.
 - c. There may be various inhibitions.
 - d. All forms of habit formation previously discussed may be involved.

III. The concept of personality types is important, yet it has led to confused use of terms.

A. Type has been used to denote the extremes on a bell-shaped, normal distribution curve.

B. Type has been used in reference to the two groups which, when measured and the results plotted, show a bimodal distribution, a continuous distribution on a single base line, but with two peaks or modes.

C. Type has been used to describe distributions which are really discontinuous, which, when measured and the results plotted on a single base line, show two distinct distributions.

D. Type has been used to designate particular arrangements of patterns.

1. This is the best use of the concept.
2. Type is defined in terms of necessary interlinkings of traits.
3. The theory of eidetic types is an example of hypotheses developed from this concept:
 - a. The T-type, condition similar to muscle tetany:
 - (1) Irritability of sensory and motor nerves
 - (2) Imagery is similar to negative after-images.
 - (a) Subject has no control over the images.
 - (b) The images seem to be intruders into his mental life.
 - (3) Defect of the parathyroid gland is important in this condition.
 - b. The B-type, condition similar to Basedow's disease:

- (1) Rich and impulsive emotional life
- (2) Imagery is similar to the memory image.
 - (a) Subject has considerable voluntary control over the images.
 - (b) The images are intimately bound up with the emotional life.
- (3) Overactivity of the thyroid is important in this condition.
- c. These types are probably not caused by simple operation of defect in one gland.
 - (1) The endocrine glands interact.
 - (2) The conditions probably represent entirely different modes of organization of the entire endocrine system.
- d. This theory is important as an example of working hypotheses as to organization of personality.

Name Section Date.....

Do these exercises after you have read Chapter XXII. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

—1. Attitudes are determined largely

(a) in the period before adolescence (b) in the period immediately following adolescence (c) between the ages of 15 and 20 (d) by rational processes (e) by economic self-interest.

—2. Matching handwriting and personality sketches

(a) is a vital part of vocational psychology (b) proves that people tend to lie about personal matters (c) is impossible (d) shows nearly 100 per cent correspondence (e) gives results somewhat better than could be obtained by guessing.

—3. In guessing the occupations or backgrounds of people from photographs, college students

(a) showed practically no agreement among themselves (b) were less successful than trade union members (c) showed very little tendency to follow common opinion of the photographs (d) tended to rate on the basis of "stereotypes" (e) fell into two main types, intuitive and intellective.

—4. The ultimate basis of personality traits is

(a) propaganda (b) eidetic imagery (c) drives (d) statistical manipulation (e) results of behavior tests.

— — 5. Which three of the following characteristics distinguish the T-type?

(a) defect of the thyroid gland (b) overactivity of the thyroid gland (c) defect of the parathyroid gland (d) overactivity of the parathyroid gland (e) excessive muscle tonus (f) defective muscle tonus (g) persistent images which cannot be voluntarily controlled (h) fluid images, under voluntary control (i) a rich and impulsive emotional life.

—6. When we speak of an eidetic type we are using the term type in the sense of

(a) extremes of a continuous distribution (b) possession of attributes having some fixed interrelation (c) an average of many individuals who actually differ markedly from the type (d) membership in one of the two groups in a bimodal distribution (e) membership in one of two discontinuous distributions of the same trait.

—7. The questionnaire method has been used most intensively in the study of

(a) intelligence (b) nervous habits (c) attitudes and personality traits (d) stereotypes (e) sex differences.

—8. The greatest defect of the questionnaire method is

(a) low reliability (b) anonymity of results (c) sampling errors (d) bimodality of the distributions obtained (e) normal distribution of personality traits.

—9. The reliability of a test increases with

(a) an increase in the number of items (b) a decrease in the number of items (c) the amount of actual observation of specific behavior involved (d) the length of time between test and retest (e) the amount of innate capacity involved.

—10. The rating scale is principally valuable in measuring

(a) social attitudes (b) the effects of propaganda (c) nervous habits such as thumb-sucking (d) personality types (e) traits easily observable by associates of the subject.

Chapter XXIII

Try to answer these questions before you read Chapter XXIII.

What is the fundamental nature of the human personality?

In what way is the child father to the man?

In what sense is the term "abnormal" used?

How do mental abnormalities arise?

How can mental disorders be cured?

Which of the numerous theories of personality are you familiar with?

Can any of the theories of personality be universally applied—to members of primitive as well as of civilized cultures? Discuss.

CHAPTER XXIII—THE THEORY OF PERSONALITY

- I. Behaviorism, the theory advanced by Watson, regards the conditioned response as the basis for personality.
 - A. Conditioned emotional responses may be established which cause responses to stimuli only remotely resembling the stimuli which first aroused them.
 - B. This view is almost entirely theoretical, little experimental justification as yet.
 1. Limits of conditioning still unknown.
 - a. Permanence of responses conditioned in childhood is unknown.
 - b. The manner in which complexities of experience reinforce, rather than cause to be dropped out, conditioned responses is unknown.
 2. Process of development has never been actually studied from this point of view.
 - a. Most students of childhood believe that many innate differences in traits appear through maturation year by year through the entire growth.
 - b. Innate differences in structure of glandular and muscular systems suggest that differences in effectiveness of experience as long-time conditioners may be due to hereditary factors.
- II. Janet, proceeding from the point of view of psychiatry, suggested that normal personality depends on the mental capacity for synthesis of experiences, on "psychic tension."
 - A. The mind is essentially an aggregate of parts.
 1. Each part may be considered a sensation, image, or idea.
 2. The parts are integrated by virtue of a biological principle, psychic tension.

- a. In the normal individual, there is psychic tension enough to hold ideas together.
- b. In times of great stress, psychic tension may be low and ideas may be broken off from the rest.
 - (1) Such an idea is a "fixed idea" which keeps coming back, although irrelevant.
 - (2) Psychasthenia is the name designating neuroses involving obsessions, compulsions, and phobias.
 - (a) An obsession is the chronic recurrence of an absurd or troublesome idea which is known by the patient not to be based on real fact.
 - (b) A compulsion is an irresistible impulse to perform some apparently unreasonable act.
 - (c) A phobia is the capacity of a stimulus to arouse fear without other clear-cut manifestations.

B. Ideas may be completely broken off from consciousness.

- 1. Such ideas are forced into the unconscious.
- 2. An excellent method for studying dissociation is through the use of hypnosis.

III. The psychoanalytic theory of Freud suggests that personality is largely the result of social contacts and social pressures.

A. The very young child follows the "pleasure principle."

- 1. The id is the original basis of personality, blindly striving, pleasure-seeking impulses.
- 2. The ego, the set of symbols which differentiates the experiencing organism from the outside world, is partly unconscious.
 - a. The ego emerges from the id as the child becomes aware of his own existence.
 - b. The unconscious part of the ego remains on a primitive, instinctive level.
 - c. The conscious part of the ego becomes the socially approved self.

B. Parental discipline and other hard experiences result in the emergence of the "reality principle" of child behavior.

- 1. The early tendency of the child to identify himself with his parents results in the development of another sphere of the personality, the super-ego.
- 2. The super-ego, or conscience, adopts toward the ego the attitude taken by the disciplining authorities with which the child has identified himself.

C. Childish habits persist in adult life.

- 1. Primitive cravings of a little child become fixated upon the parents.
 - a. The mother is at first the object of affection.
 - b. The father later is also included.
- 2. The relative emphasis of the fixations differs for boys and girls at different ages.

a. The tendency of the boys in our society is called the Oedipus complex.

(1) There is an identification with the father.

(2) There is a desire to belong to and possess the mother.

(3) There is a resultant conflict; the child loves and hates the father.

b. There is a reverse situation for the girls, identified with the mother.

3. Conflict among activities in response to desire by the id and the organization of the ideals of the ego and the super-ego must be resolved.

a. The ego and the super-ego combine against the id.

b. Where the super-ego is hostile to the ego, serious personality difficulties ensue.

c. The change from the pleasure principle to the reality principle represents the development of control.

4. Repressed experiences which condition emotional life are not accessible to reconditioning or extinction of the conditionings.

a. Only a small part of the mind is conscious.

b. Repressed material is forced out of consciousness.

c. Unconscious processes may continue to act as motives.

d. During the process of psychoanalysis experiences are consciously recalled to be reconditioned.

(1) Transference, adopting toward the analyst an attitude such as was held in childhood toward the father, is necessary for the success of an analysis.

(2) When unconscious sources of trouble are found in the patient, the emotional reeducation is undergone.

D. Mental health depends on the education of the basic emotional drives so that they may find an acceptable outlet.

IV. Analytical psychology, Jung's doctrine, regards the basic instinct as a universal psychic energy.

A. Jung's theories developed as an independent "school" after having added to Freud's theories.

1. Jung's contributions to Freudian development were important.

a. He supplied a systematic description of the disorder "dementia precox."

b. He brought clinical practice into closer relation with experimental work.

2. Jung protested that Freud was confused in the concept of sexuality as descriptive of the libido, the basic instinct.

3. Jung differed from Freud, further, in his emphasis on the inheritance of primitive emotional attitudes from remote ancestors.

a. The unconscious is primitive and irrational.

b. The unconscious thinks symbolically, not because of repression, but because this is the nature of free, uncritical thinking.

- B. There are two radically different ways of confronting life situations.
 1. The extravert directs his emotional energy outward, primarily toward objects of the physical world, including persons in the social environment.
 2. The introvert's emotional energy is directed inward, toward the realm of fancy and imagination.
 3. Either of these types may express their tendency through four modes:
 - a. Thought
 - b. Feeling
 - c. Sensation
 - d. Intuition.
 4. Whatever tendencies are present in consciousness are balanced by opposing tendencies in the unconscious.
 5. Effective psychiatric work is impossible until one has discovered what personality type the patient represents.
- V. Individual psychology, Adler's doctrine, emphasizes the fact of compensation.
 - A. Compensation is the process by which an individual seeks to balance a sense of inadequacy with a real or fancied superiority in some other aspect of his personality.
 1. Child's first reaction to life is a sense of weakness.
 2. Family pattern has a permanent place in the structure of personality.
 - a. Initial inferiority is peculiarly acute if siblings are favored.
 - b. Only children are often unable to adjust to the world.
 - c. Oldest child, replaced by others, bears permanent pattern of compensation due to the dethronement.
 - d. Baby of the family often encounters more difficulty than only children.
 - B. The "style of life" is the individual's own way toward power and prestige.
 1. Basic patterns of the style of life are established in childhood.
 2. All symptoms of a personality reflect the style of life.
 - a. Neurotic symptoms have a fundamentally purposive character.
 - b. Neurotic symptoms serve to provide prestige for the patient.
 - c. All mental sickness derives from humiliation and a sense of failure.
 - C. The distinction made by other psychologies between conscious and unconscious is deemed arbitrary.
 1. We are conscious of those parts of our personalities we wish to be conscious of.
 2. Techniques of remembering and forgetting, like all other techniques, serve the superiority purpose.
 - D. Specific drives, such as the sexual, are only important to the extent that they express the fundamental drive of the will to power.
- VI. Kretschmer's theory relates body build to mental characteristics.
 - A. There are two types of body build, one a spindly build, the other a chubby type.

1. The spindly people tend to be introverted.
 - a. Extremes develop schizophrenia.
 - b. Tendencies toward schizophrenia are described as schizoid.
 2. The chubby type tends to be extraverted.
 - a. Extremes develop manic-depressive psychoses.
 - b. Tendencies toward this psychosis are described as cycloid.
 - B. Such views relating entire mental life to simple physical structure are too simple.
 1. Mental life is far too complicated to be explained in such simple terms.
 2. They are of value in reminding us of the relationship between mental characteristics and physiological functioning.
- VII. Some aspects of personality theories seem sufficiently similar to suggest basic facts.
- A. Nearly all mental disorders, barring cases of constitutional defect, are instances of mental conflict.
 1. There is a conflict of motives.
 2. Intensely motivated conduct leaves permanent traces, symbols that may start later disorders.
 3. Conflict may be between conduct prompted by a symbol and that prompted by a present stimulus.
 4. Conflict may be between two present motives of approximately equal strength.
 - B. There are unconscious motives, forces at work in the personality not evident on the surface.
 - C. Personality must be seen as a whole.
 1. Conflict of motives takes the form of intricate, incompatible aspects of the personality.
 2. Hidden, unconscious material is important in understanding personality.
 3. During the course of time, originally simple repressed experiences become bound up with many later experiences, making the repressed material a complex unit.

Name Section Date

Do these exercises after you have read Chapter XXIII. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

- 1. According to the behaviorist, personality is
(a) largely unconscious (b) to be understood in terms of the conscious "self" (c) built up of conditioned emotional responses (d) the result of organic inferiority (e) due to conflict of motives.
- 2. According to Watson, the general cause of unhealthy personalities is
(a) infantile carry-overs (b) desire to become a king or a queen (c) sexual attachment to the parent (d) the unconscious (e) conditioning of the fear reaction.
- 3. Janet emphasizes hypnosis because of its relation to
(a) dissociation (b) social attitudes (c) the super-ego (d) rating techniques (e) propaganda.
- 4. In treating a child who has acquired a violent fear of the dark, Freud would use
(a) psychoanalysis (b) emotional reconditioning (c) implicit language mechanism (d) explicit language mechanism (e) adrenin.
- 5. Repression in the Freudian sense is
(a) forcing an idea out of consciousness (b) an effect of excessive use of opium (c) an instinct (d) involuntary hypnosis (e) free association.
- 6. The phenomenon of transfer in psychoanalysis
(a) is attributed to the failure of the libido to function during infancy (b) is unusual and is a freak of the treatment (c) is created by the influence of the psychoanalytic treatment (d) involves the analyst as the object of the unconscious sexual impulses (e) is identical with the phenomenon of sublimation.
- 7. Jung differs from Freud in conceiving the libido as
(a) the sex drive (b) the will to power (c) an infantile condition of polymorphous perversion (d) a generalized psychic energy (e) always unconscious.
- 8. Jung conceives the libido as
(a) the feelings aroused by the stimulation of erogenous zones (b) a generalized sexual-parental impulse (c) a generalized life instinct (d) synonymous with the unconscious (e) the anti-social impulses of the individual.
- 9. Adler views as primary to an understanding of psychic life, the concept of
(a) psychic causality (b) the libido as the general life-energy (c) perceptual-motor forced responses (d) regression (e) purpose.
- 10. According to Adler, the individual's feeling of inadequacy and sense of frustration usually give rise to
(a) compensation (b) hysteria (c) the unconscious (d) schizophrenia (e) the Electra complex.
- 11. Adler considers sexual maladjustments as
(a) manifestations of the will to power (b) manifestations of conflict between the personal and the genetic unconscious (c) dramatized in the Oedipus complex and not

actually incestuous (d) one important cause of the development of defense mechanisms (e) one important cause of the development of the masculine protest.

—12. Adler differs from Freud in stressing the principle of

(a) purposivism (b) random occurrence of mental events (c) childhood influences (d) parental influence (e) psychogenesis.

—13. The importance of position in the family has been emphasized by

(a) Breuer (b) Janet (c) Adler (d) Jung (e) Watson.

Chapter XXIV

Try to answer these questions before you read Chapter XXIV.

1. Can a person behave "unnaturally"? Explain.
2. Is it too much to expect ultimately to know all about human nature?
3. On what will the gaining of such knowledge depend?
4. What is the value of conflicting theories in a developing science?
5. What service can the science of psychology render society as a whole?
6. What service can the science of psychology render an individual?
7. How has your course in psychology helped you to understand yourself and your social world better than you understood them before?

CHAPTER XXIV—PSYCHOLOGICAL "SCHOOLS"

- I. Psychological schools have originated in the desire to systematize psychology.
 - A. The schools have contributed useful and vital hypotheses.
 - B. The schools have tended toward one-sidedness.
 - C. Psychologists disagree as to the merits of the various systems.
 1. Data of experimental psychology do not as yet justify acceptance of a rigid system.
 2. Attempts to systematize psychology on the basis of existing information have resulted in oversimplification and misleading formulations.
 - D. Most psychologists believe that the systematization of their science will depend chiefly upon the progress made in systematizing biological sciences as a whole.
- II. Behaviorism is a doctrine for the explanation of mental processes in terms of physical processes.
 - A. The basic assumption is that human beings are equipped with many reflex arcs.
 1. Reflexes are simple units of action.
 2. Each reflex can be called out by some specific stimulus.
 3. Units usually work in combination except where special technique is used to separate them.
 4. By conditioning, any reaction unit or combination of reaction units can be called out by almost any stimulus.
 - B. All the more complicated aspects of human life can be treated as conditioned reflexes based on the simple reflex units.
 1. The higher mental processes are complex muscular adjustments of the body to external and internal stimuli.
 2. Different muscular responses, especially speech responses, are studied.
 - a. In many cases the response stimulates another response.

- b. Skilled acts involve muscular contractions appearing as the result of preceding muscular contractions.
 - 3. There is no interest in experiences for their own sake.
 - C. The attempt is made to pattern psychology after biology.
 - 1. All mental events are treated as physical responses in the body.
 - 2. The brain is considered nothing but the connecting station between organs of response.
- III. Existential, or introspective, psychology is the study of subjective experiences as directly known to the subject.
- A. The attempt is made to break up complex processes into simple ones.
 - 1. The whole is understood in the light of relations between parts which can be studied in isolation.
 - 2. The primary data of experience are sensations and images.
 - a. These are studied in laboratory situations by trained observers.
 - b. The doctrine of association of ideas represents the laws of the relation between these elements.
 - B. A great difference between existential psychology and behaviorism is the emphasis the former gives to attention.
 - 1. Attention contributes the quality of clearness to an experience.
 - 2. The course of mental life involves constant change in relative clearnesses.
 - a. Conscious state is not the persistence of some one fixed entity.
 - b. Trained observers must learn how to note and report the changes.
- IV. Gestalt psychology emphasizes that every mental state must be taken for what it is as a whole, not as a compound of hypothetical elements.
- A. This school arose as a protest against atomism in psychology.
 - 1. An experiment in the perception of apparent movement resulted in the conclusion that the perception of movement comes directly.
 - 2. The principle stated that a percept is an indivisible unity.
 - B. The principle of the indivisible unity of each response of an organism is emphasized in the experimental work in all fields.
 - 1. Research in learning and other fields has shown the fruitfulness of the concept.
 - 2. The pattern, or Gestalt, of behavior as a whole is what is interesting and important.
- V. Development of further experimentation will ultimately bring the schools together.
- A. Experimental methods have been applied in one new field after another.
 - B. Quantitative devices are being developed; all truly scientific information is in quantitative form.
 - C. What psychology will be able to do will depend on those things on which all scientific research depends:
 - 1. Partly on the development of scientific method
 - 2. Partly on social and economic developments.

Name Section Date.....

Do these exercises after you have read Chapter XXIV. Select the most satisfactory of the alternatives presented and place its letter on the line provided at the left.

—1. The main difference between behaviorism and existential psychology is the emphasis of the latter on the subject's

(a) objective behavior (b) inferiority complex (c) speech organs (d) experience (e) style of life.

—2. To the behaviorist "perception," "attention," "volition," etc., are

(a) patterns of mental life (b) categories of experience (c) kinds of mental processes (d) non-existent (e) muscular adjustments of the body.

—3. To the behaviorist the units with which the psychologist must deal are

(a) special abilities (b) reflexes (c) sensations and images (d) Gestalten (e) conditioned stimuli.

—4. A systematic behavioristic account of personality would put a minimum of emphasis upon

(a) heredity (b) symbolism (c) conditioning (d) muscular responses (e) infancy.

—5. The first psychological laboratory, founded by Wundt in 1879, studied primarily

(a) the conditioned reflex (b) sense perception (c) learning (d) personality development (e) motives.

—6. The study of the perception of movement led to the development of a doctrine by

(a) Plato (b) Locke (c) Bekhterev (d) Wertheimer (e) Stern.

—7. Attempts to systematize psychology on the basis of our existing information have led to

(a) an inevitable acceptance of the Gestalt explanation (b) an inevitable acceptance of the fundamental nature of the conditioned reflex (c) a rejection of all schools of psychology as valueless (d) oversimplified and misleading formulations (e) a distrust of experimental method.

—8. According to Gestalt psychology

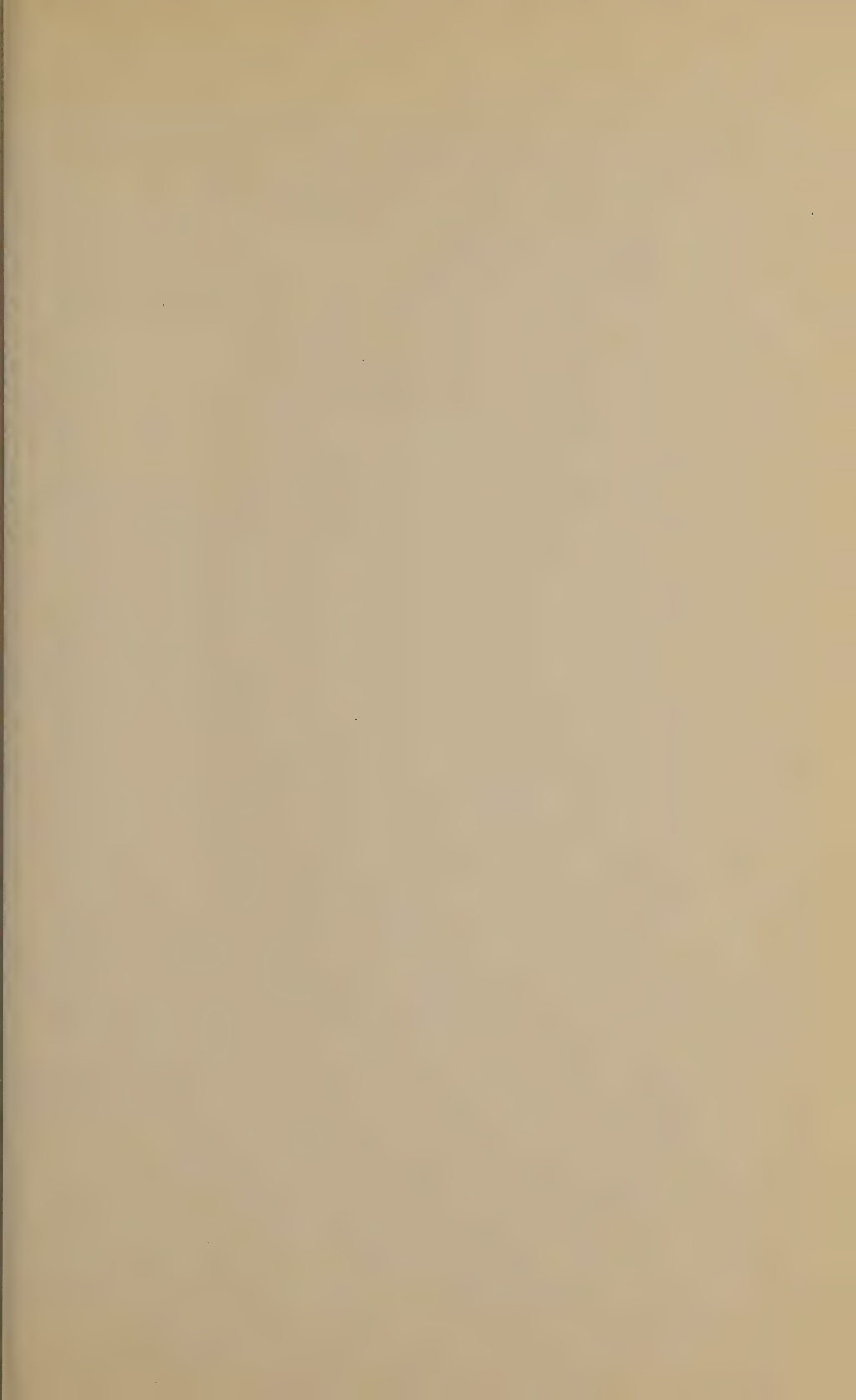
(a) the whole is equal to the sum of its parts (b) the parts are equal to a geometric fraction of the whole (c) the parts are equal to an arithmetic fraction of the whole (d) the parts determine political organization (e) the whole determines its parts.

—9. The basis of Gestalt theory is

(a) that the association of a number of psychical elements explains total experience (b) that the important thing is to divide men up not into ideas, but into reflexes (c) that the whole is not the sum of its parts but a totality which must be directly grasped (d) that chemical analysis is necessary for a description of mental life (e) that the experimental approach is useless.

—10. In studying expressive movement the Gestalt psychologist emphasizes

(a) the rôle of the face (b) the rôle of the hands (c) the amount of actual space utilized by the individual (d) the general pattern of behavior (e) the reflexive basis of the expression.





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